Fatigue and Mental Health Problems in the Working Population: Descriptives and Associations with Consulting a Physician

ISBN: 90-6734-050-2

Lay-out: Hannelore Engels, Helene Andrea
Cover design: Emiel van der Logt (Grafitek), Helene Andrea
Book preparation and printing: Optima Grafische Communicatie, Rotterdam

Fatigue and Mental Health Problems in the Working Population : Descriptives and Associations with Consulting a Physician

PROEFSCHRIFT

ter verkrijging van de graad van doctor
aan de Universiteit Maastricht,
op gezag van de Rector Magnificus,
Prof. dr. A.C. Nieuwenhuijzen Kruseman,
volgens het besluit van het College van Decanen,
in het openbaar te verdedigen
op vrijdag 28 november 2003 om 14.00 uur

door

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The Maastricht Cohort Study is part of the Netherlands concerted research action on "Fatigue at Work" granted by the Netherlands Organization for Scientific Research (NWO). The study presented in this thesis was supported by the Netherlands Organization for Scientific Research (NWO grant no. 580-02.255, part I).

The study presented in this thesis was conducted at the Research Institute for Extramural and Transmural Health Care (ExTra), which participated in the Netherlands School of Primary Care Research (CaRe), acknowledged in 1995 by the Royal Dutch Academy of Science (KNAW).

CONTENTS

1

General Introduction

Both fatigue and mental health problems are common in the working population.[1-4] Fatigue was found to be a predictor of permanent work disability,[5] while one in every three work disability benefit recipients is classified as being disabled for work on mental grounds in the Netherlands.[6] Other studies in the working population also indicate that mental health problems can lead to a substantial degree of functional disability and work impairment.[4,7,8] As a result, fatigue and mental health problems can both have adverse economic and social consequences for individual employees, their employers, and society as a whole, and can both be considered as potentially threatening the work ability of employees.

In employees not meeting the demands posed by their work and frequently or long-term absent from work, (occupational) health care professionals will be involved in providing advice regarding return to work and occupational rehabilitation. However, employees can already have experienced problems in the workplace and have felt the need to seek help while still at work, hence before sickness absence is present. Gathering information about problems that may threaten the work ability of employees who are not yet absent from work but nevertheless seek help, can help to develop strategies aiming to enhance the likelihood that these employees stay at work and strategies aiming to prevent frequent and/or long-term sickness absence. Within the Dutch health care system, the general practitioner (GP) has a central position and gatekeeping function for the general population regarding diagnosing, taking care of support for, treating and/or taking care of referral for health problems. Since a substantial part of the general population is employed (approximately 65% in the Netherlands), the GP is also likely to be confronted with patients in whom their consultation to the GP may be related to their working situation. Consequently, gathering information about problems that may be a threat to the work ability in employees who are visiting while not yet absent from work, may give GPs insight in which factors to focus on in the consultation that may possibly help the employee to maintain his or her work ability. Besides consulting their GP, employees can also choose to consult an occupational physician (OP). From 1998 on, all Dutch companies and organizations have provided access to an OP for their employees. Besides their task to advise employees absent from work and their employers about resuming work and occupational rehabilitation, OPs also have the task to guard the work ability of employees still at work.[9,10] To enable both type of physicians to be involved in guarding the work ability of their employed patients, studies that focus on indicators of problems potentially threatening the work ability of employees and relate these problems to help seeking behaviour, may be useful. Whereas help seeking behaviour has extensively been studied in the general population, studies about characteristics of users of occupational or general health care have as yet not been conducted specifically in the working population.

Within the literature about help seeking behaviour in the general population, it has repeatedly been indicated that the decision to consult a health care professional is the result of a comprehensive and multi-etiological process, with influences from a broad range of individual, social, cultural, psychological and health-related factors.[11-15] As a part of this multifactorial process, however, a prominent role is attributed to the influence of health-related factors. For example, health status and self-rated health were identified as determinants of consulting a physician in a population-based study,[16] and in a working-age population.[17] Within the field of health problems, both fatigue and mental health problems are not only common in the general population[18-22] and in primary care,[19,23-25] but they can also have a pervasive effect on several aspects of daily living, among which health-related quality of life, working, and socializing.[8,26-28] The possible impact of fatigue and of mental health disorders has been found to be comparable to the impact of chronic somatic conditions for the patient.[29,30] Hence, although unnecessary medical labeling should be avoided, both fatigue and mental health problems should not automatically be considered as trivial health problems, and deserve the attention of physicians. Although fatigue can also be present as a normal reaction to strenuous activities or for example a viral infection, it can turn into a more serious health problem when it becomes persistent or when compensation mechanisms for the reduction of fatigue (e.g. taking more rest) are not effective anymore.[31] Fatigue can also manifest itself as a symptom of not only a wide range of somatic conditions but of mental health problems as well, in particular anxiety and depression.[2,32,33] In turn, associations have also been found between mental health problems and somatic conditions.[34-36] Hence, it may be important to take interrelationships between fatigue, mental health problems and chronic diseases into account when studying direct associations between fatigue or mental health problems and consulting a physician.

While complex associations can be expected between fatigue, mental health problems, chronic physical conditions and consulting a physician in the general population, an even more complex picture may be present in the working population. Within the working population, intertwined associations can be expected between health, work, and help seeking behaviour . In accordance with a shift from physical to mental work stressors,[37] over the past decades more attention has been paid to the impact of psychosocial work characteristics on health of employees. Psychosocial work characteristics have been identified as determinants of not only fatigue and mental health problems[38-47] , but of physical illness as well.[40] As a consequence of their association with health problems, psychosocial work characteristics may also be related to help seeking behaviour in employees who experience problems in the workplace. The importance of focusing on health and psychosocial work characteristics of employees is supported by several studies in the working population that identified health

problems and employees' perception of the work environment as determinants of subsequent sickness absence.[44,48-58] In turn, this sickness absence (as an expression of lack of functioning in the workplace)[50] can have severe consequences in terms of loss of productivity for employers and the society, and a reduced income and the risk of social isolation for the employee. In the light of diminishing or even preventing these consequences for employees, employers and society, it is therefore of paramount importance to study the involvement of indicators of health problems and psychosocial work characteristics on employees' functioning in the workplace and their help seeking behaviour. In this thesis, we aimed to explore this involvement, by studying intertwined associations between fatigue, (mental) health problems, psychosocial work characteristics and consulting the GP or OP in the working population.

Aims of the study

This thesis studies characteristics of employees in terms of consulting the GP or OP, indicators of health problems, and work-related factors. Within all possible complex relationships between indicators of health problems and work-related factors, special attention will be paid to the presence of fatigue, mental health problems, and psychosocial work characteristics. Overall, the focus of the thesis is on the following two central questions:

1. What are characteristics of employees consulting the General Practitioner or Occupational Physician, in terms of fatigue, (mental) health problems, and psychosocial work characteristics?
2. How can the working population be characterized in terms of fatigue and mental health problems?

The Maastricht Cohort Study as the study framework

All studies presented in this thesis are conducted within the Maastricht Cohort Study on "Fatigue at Work", a large-scale prospective epidemiological study in the working population.[3,59,60] The baseline population of the Maastricht Cohort Study consisted of 12,140 employees coming from 45 different companies and organizations, and representing 678 different professions. Between May 1998 (the baseline questionnaire) and January 2001 (the ninth questionnaire), the cohort participants received a new self report cohort questionnaire every four months, incorporating items about a broad range of work-related factors, domestic and social factors, demographics, health problems, and personal characteristics. Once a year (the first, fourth and seventh questionnaire), the cohort participants received an extensive questionnaire that consisted of a broader range of both exposure and outcome measurements than the other two questionnaires. Consequently, some

measurements (for example, about fatigue) were included in each questionnaire, while information about other data (for example, about psychosocial work characteristics) was gathered once a year. Furthermore, two cohort subsamples with a contrast in level of fatigue (employees with a very low level of fatigue, versus employees with a very high level of fatigue; n=400 each) received an additional questionnaire consisting of questions about mental health problems, in particular regarding the presence of pathological worrying as a mental health-related individual characteristic.

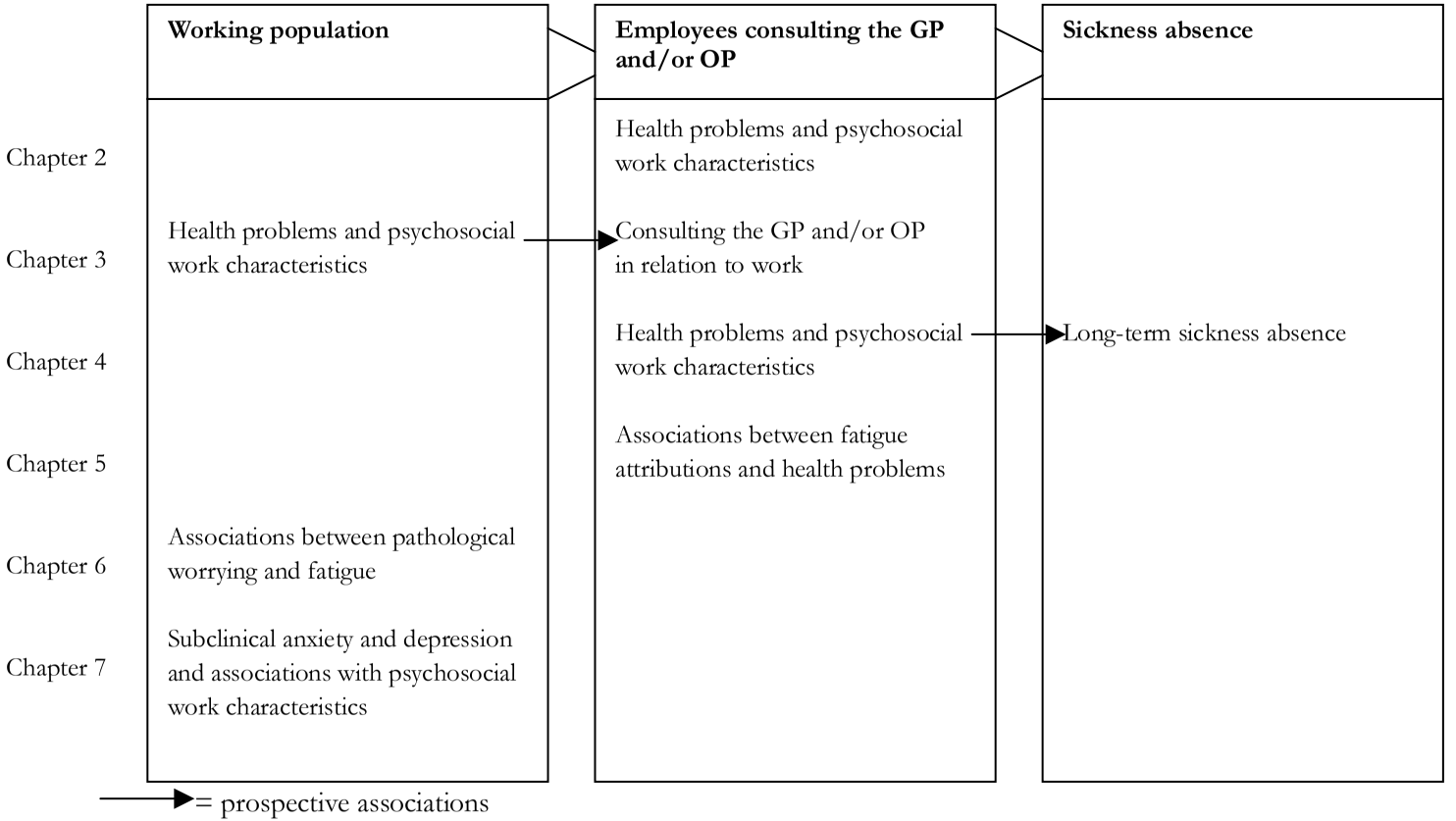
Outline of the thesis

Figure 1 provides a schematic overview of the outline of this thesis. In chapter 2 to 5, indicators of health problems in the form of fatigue, mental health problems, chronic conditions with a somatic character or with somatic elements (also referred to as long-term diseases, long term conditions, or chronic illness), and psychosocial work characteristics of employees are studied in association to consulting the GP and/or OP. In *chapter 2*, health problems and psychosocial work characteristics present in employees indicating having visited the GP in relation to work are compared to these characteristics in employees indicating not having visited the GP in relation to work. This cross-sectional study encompasses the entire baseline population of the Maastricht Cohort Study. In *chapter 3*, health problems and psychosocial work characteristics are examined as predictors of visiting the GP or OP in relation to work versus visiting neither GP, nor OP in relation to work in employees active at work. *Chapter 4* presents the results of a longitudinal study in which the effect of health problems and psychosocial work characteristics on subsequent long-term sickness absence was studied in employees active at work and having visited the GP and/or OP in relation to work. The cross-sectional study in *chapter 5* focuses on health problems, employees' fatigue attributions, and psychosocial work characteristics of employees active at work and indicating having consulted the GP or OP in relation to fatigue.

Whereas chapter 5 focused on fatigue in employed visitors of the GP or OP, chapter 6 and 7 examine fatigue and mental health problems in the entire working population. *Chapter 6* addresses cross-sectional and longitudinal associations between pathological worry as a mental health-related individual characteristic and fatigue. *Chapter 7* focuses on anxiety and depression as two separate constructs of mental health problems, and examines their prevalence and associations with psychosocial work characteristics.

In addition to the Discussion sections in chapter 2 to 7 for each study separately, the epilogue (*chapter 8)* comprises conclusions, methodological considerations and recommendations for further research on a more general level.

Figure 1 – Overview of studies presented in this thesis



REFERENCES

1. Chevalier A, Bonenfant S, Picot MC, et al. Occupational factors of anxiety and depressive disorders in the French National Electricity and Gas Company. J Occup Environ Med 1996;38:1098-1107.
2. Tiesinga L, Dassen TWN, Halfens RJH. Fatigue: A summary of the definitions, dimensions, and indicators. Nurs Diagn 1996;7:51-62.
3. Bültmann U, Kant IJ, Kasl SV, Beurskens AJHM, van den Brandt PA. Fatigue and psychological distress in the working population: psychometrics, prevalence and correlates. J Psychosom Res 2002;52:445-52.
4. Laitinen-Krispijn S, Bijl RV. Mental disorder and employee sickness absence: the NEMESIS study. Soc Psychiatry Psychiatr Epidemiol 2000;35:71-7.
5. Van Amelsvoort LGPM, Kant I, Beurskens AJHM, Schroër CAP, Swaen GMH. Fatigue as a predictor of work disability. Occup Environ Med 2002;59:712-3.
6. Houtman I. Feiten en fabels op een rij. Werkdruk in cijfers (Work pace in numbers). Arbeidsomstandigheden 1999;75:2-5.
7. Stansfeld S, Feeney A, Head J, et al. Sickness absence for psychiatric illness: the Whitehall II study. Soc Sci Med 1995;40:189-97.
8. Kessler RC, Frank RG. The impact of psychiatric disorders on work loss days. Psychol Med 1997;27:861-73.
9. Van Dijk FJH, Prins R. Occupational health care and work incapacity: recent developments in the Netherlands. Occup Environ Med 1995;45:159-66.
10. Buijs P, van Amstel R, van Dijk F. Dutch occupational physicians and general practitioners wish to improve cooperation. Occup Environ Med 1999;56:709-13.
11. Philipsen H, Het verloop van een ziektegeval en de aanvaarding van de rol van patient. In: Afwezigheid wegens ziekte, p.16-31 Groningen, 1969.
12. Mechanic D. Health and illness behavior and patient-practitioner relationships. Soc Sci Med 1992;34:1345-50.
13. Armstrong D. Outline of sociology as applied to medicine (fourth ed.). Oxford: Butterworth-Heinemann; 1994.
14. Campbell SM, Roland MO. Why do people consult the doctor? Fam Pract 1996;13:75-83.
15. Aakster CW, Groothoff JW, eds. Medische sociologie: sociologische perspectieven op ziekte en zorg (fifth ed.) (Medical Sociology; fifth ed.). Groningen: Wolters-Noordhoff, 1998..
16. Al-Windi A, Dag E, Kurt S. The influence of perceived well-being and reported symptoms on health care utilization: A population-based study. J Clin Epidemiol 2002;55:60-6.
17. Miilunpalo S, Vuori I, Oja P, Pasasueu M, Upronen H. Self-rated health status as a health measure: the predictive value of self-reported health status on the use of physician services and on mortality in the working-age population. J Clin Epidemiol 1997;5:517-28.
18. Chen MK. The Epidemiology of Self-Perceived Fatigue among Adults. Prev Med 1986;15:74-81.
19. Lewis G, Wessely S. The epidemiology of fatigue: more questions than answers. Journal Epidemiol Community Health 1992;33:191-8.
20. Pawlikowska T, Chalder T, Hirsch SR, et al. Population based study of fatigue and psychological distress. BMJ 1994;308:763-6.

21. Loge JH, Ekeberg O, Kaasa S. Fatigue in the general norwegian population: normative data and associations. J Psychosom Res 1998;45:53-65.
22. Addington AM, Gallo JJ, Ford DE, Eaton WW. Epidemiology of unexplained fatigue and major depression in the community: The Baltimore ECA Follow-up, 1981-1994. Psychol Med 2001;31:1037-44.
23. David A, Pelosi A, McDonald E, et al. Tired, weak or in need of rest: fatigue among general practice attenders. BMJ 1990;301:1199-1202.
24. Cathebras PJ, Robbins JM, Kirmayer LJ, Hayton BC. Fatigue in primary care: prevalence, psychiatric comorbidity,illness behavior and outcome. J Gen Intern Med 1992;7:276-86.
25. Hickie IB, Hooker AW, Hadzi-Pavlovic D, et al. Fatigue in selected primary care settings: sociodemographic and psychiatric correlates. Med J Aust 1996;164:585-8.
26. Nelson E, Kirk J, McHugo G, et al. Chief complaint fatigue: a longitudinal study from the patient's perspective. Fam Pract Res J 1987;6:175-88.
27. Kouzis AC, Eaton WW. Psychopathology and the development of disability. Soc Psychiatry Psychiatr Epidemiol 1997;32:379-86.
28. Bijl RV, Ravelli A. Current and residual functional disability associated with psychopathology: Findings from the Netherlands Mental Health Survey and Incidence Study (NEMESIS). Psychol Med 2000;30:657-68.
29. Kroenke K, Wood DR, Mangelsdorff D, Meier NJ, Powell JB. Chronic Fatigue in Primary Care: Prevalence, Patient Characteristics, and Outcome. JAMA 1988;260:929-34.
30. Muehrer P. Research on co-morbidity, contextual barriers and stigma; An introduction to the special issue. J Psychosom Res 2002;53:843-5.
31. Meijman TF. Over vermoeidheid: arbeidspsychologische studies naar beleving van belastingeffecten (Fatigue: studies on the perception of workload effects). Amsterdam: University of Amsterdam; 1991.
32. Ridsdale L, Evans A, Jerrett W, et al. Patients with fatigue in general practice: a prospective study. BMJ 1993;307:103-6.
33. Ridsdale L, Evans A, Jerret W, et al. Patients who consult with tiredness: frequency of consultation, perceived causes of tiredness and its association with psychological distress. Brit J Gen Pract 1994;44:413-6.
34. Hotopf M, Mayou R, Wadsworth M, Wessely S. Temporal relationships between physical symptoms and psychiatric disorder. Results from a national birth cohort. Br J Psychiatry 1998;173:255-61.
35. Kisely SR, Goldberg DP. Physical and psychiatric comorbidity in general practice. Br J Psychiatry 1996;169:236-42.
36. Verhaak PF. Somatic disease and psychological disorder. J Psychosom Res 1997;42:261-73.
37. Schaufeli W, Bakker A, de Jonge J. De psychologie van arbeid en gezondheid. Houten/Mechelen: Bohn Stafleu Van Loghum; 2003.
38. Karasek RA. Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. Administrative Science Quarterly 1979;24:285-311.
39. Karasek RA, Theorell T. Healthy work: stress, productivity and the reconstruction of working life. New York: Basic Books; 1990.
40. Muntaner C, Schoenbach C. Psychosocial work environment and health in U.S. metropolitan areas: a test of the demand-control and demand-control-support models. Intern J Health Serv 1994;24:337-53.

41. Stansfeld SA, North FM, White I, Marmot MG. Work characteristics and psychiatric disorder in civil servants in London. J Epidemiol Community Health 1995;49:48-53.
42. Bourbounnais R, Brisson C, Moisan J, Vezina M. Job strain and psychological distress in white-collar workers. Scand J Work Environ Health 1996;22:139-145.
43. Niedhammer I, Goldberg P, Leclerc A, Bugel I, David S. Psychosocial factors at work and subsequent depressive symptoms in the Gazel cohort. Scand J Work Environ Health 1998;24:197-205.
44. De Jonge J, Reuvers MMEN, Houtman ILD, Bongers PM, Kompier MAJ. Linear and nonlinear relations between psychosocial job characteristics, subjective outcomes, and sickness absence: baseline results from SMASH. J Occup Health Psychol 2000;5:256-8.
45. De Jonge J, Bosma H, Peter R, Siegrist J. Job strain, effort-reward imbalance and employee well-being: a large-scale cross-sectional study. Soc Sci Med 2000;50:1317-27.
46. Bültmann U, Kant IJ, Schroër CAP, S.V. K. The relationship between psychosocial work characteristics and fatigue and psychological distress. Int Arch Occ Environm Health 2001;75:259-266.
47. Bültmann U, Kant IJ, van den Brandt PA, Kasl SV. Psychosocial work characteristics as risk factors for the onset of fatigue and psychological distress: Prospective results from the Maastricht Cohort Study. Psychol Med 2001;32:333-45.
48. Kristensen T. Sickness absence and work strain among Danish slaughterhouse workers: an analysis of abence from work regarded as coping behaviour. Soc Sci Med 1991;32:15-27.
49. North F, Lyme S, Feeney A, et al. Explaining socioeconomic differences in sickness absence: the Whitehall II study. BMJ 1993;306:361-6.
50. Marmot M, Feeney A, Shipley M, North F, Syme SL. Sickness absence as a measure of health status and functioning: from the UK Whitehall II Study. J Epidemiol Community Health 1995;49:124-30.
51. North FM, Syme SL, Feeney A, Shipley M, Marmot M. Psychosocial work environment and sickness absence among British civil servants: the Whitehall II study. Am J Public Health 1996;86:332-40.
52. Kivimaki M, Vahtera J, Thomson L, et al. Psychosocial factors predicting employee sickness absence during economic decline. J Appl Psychol 1997;82:858-72.
53. Stansfeld SA, Rael EGS, Head J, Shipley M, Marmot M. Social support and psychiatric sickness absence: a prospective study of British civil servants. Psychol Med 1997;27:35-48.
54. Niedhammer I, Bugel I, Goldberg M, Leclerc A, Guéguen A. Psychosocial factors at work and sickness absence in the Gazel cohort: a prospective study. Occup Environ Med 1998;55:735-41.
55. Smulders PGW, Nijhuis FJN. The Job Demands-job control model and absence behaviour: results of a 3-year longitudinal study. Work Stress 1999;13:115-31.
56. Bourbonnais R, Mondor M. Job Strain and Sickness Absence Among Nurses in the Province of Quebec. American Journal of Industrial Medicine 2001;39:194-202.
57. Evans O, Steptoe A. The contribution of gender-role orientation, work factors and home stressors to psychological well-being and sickness absence in male- and female-dominated occupational groups. Soc Sci Med 2002;54:481-92.

58. Laitinen-Krispijn S, Bijl R. Werk, psyche en ziekteverzuim; aard en omvang van psychische stoornissen, ziekteverzuim en zorggebruik in de beroepsbevolking (Work, psyche and sickness absence; nature and magnitude of mental health problems, sickness absence and use of health care in the working population). Utrecht: Trimbos Instituut; 2002.
59. Kant IJ, Beurskens AJHM, Schroër CAP, et al. De Maastrichtse Cohort Studie naar langdurige psychische vermoeidheid in de arbeidssituatie (The Maastricht Cohort Study of prolonged Fatigue at Work). Tijdschrijft voor bedrijfs- en verzekeringsgeneeskunde 2000;8:226-32.
60. Kant IJ, Bültmann U, Schröer CAP, et al. An epidemiological approach to study fatigue in the working population: The Maastricht Cohort Study. Occup Environ Med 2003;60:i32-9.

Characteristics of employees who did or did not consult the general practitioner in relation to work

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International Archives of Occupational and Environmental Medicine 2003;76:69-74

ABSTRACT

Objectives
To examine how health problems and psychosocial work characteristics are associated with having visited or not having visited the General Practitioner (GP) in relation to work.

Methods
Baseline self-report data of the Maastricht Cohort Study about fatigue at work were used to gather information about fatigue (Checklist Individual Strength), presence of at least one long-term disease, likelihood of having a mental illness (General Health Questionnaire), and psychosocial work characteristics (psychological job demands, decision latitude and social support at work, as measured with the Job Content Questionnaire). The cohort participants indicated having visited (VISITORS) or not having visited (NON-VISITORS) the GP in relation to work. Differences between these groups were measured using multivariate logistic regression analyses.

Results
When compared to VISITORS and taking into account the influence of sociodemographic characteristics and mutual associations between reported health problems and psychosocial work characteristics, a lower percentage of NON-VISITORS reported at least one long-term disease, NON-VISITORS presented lower levels of fatigue and psychological job demands, and higher levels of decision latitude and social support at work.

Conclusions
The results of this study indicate that NON-VISITORS reported less health problems and a more positive perception of their work environment than VISITORS did. Interrelationships between psychosocial work characteristics and health variables should be taken into consideration when studying their associations with visiting the GP in relation to work.

INTRODUCTION

In the Dutch health care system, General Practitioners (GPs) aim to pay attention to people with health complaints or problems in the general population. However, not all symptoms of ill health are brought to the attention of medical professionals,[1] and people with mental health problems instead of problems with a more somatic character may be less likely to visit the GP. While the decision to consult a doctor is known to be affected by the presence of chronic diseases with a somatic character,[2-5] about one-third of the general population thinks not to be able to discuss personal problems with a GP in a consumer survey.[6] Furthermore, an everyday health problem such as fatigue is often also no reason to visit the GP, as fatigue itself can be considered as an intrinsic part of life. However, fatigue can turn into a more serious health problem when it becomes persistent or when compensation mechanisms for the reduction of fatigue (e.g. taking more rest) are not effective anymore.[7] Fatigue can be a primary complaint in general practice patients, but it is also known to be associated with a wide range of somatic conditions[8] and psychiatric problems commonly encountered in general practice patients (especially depression and anxiety).[8,9]

The working population comprises a substantial part of the general population. So far, however, little is known about help seeking behaviour in the working population. Nevertheless, studying health care needs of the working population is important in its own right, as mutual associations between work and health problems can be expected to be associated with help seeking behaviour of employees. On the one hand, employed people report lower levels of health problems than those unemployed, as a certain level of health is acquired to be able to work (known as the healthy worker effect[10]). On the other hand, problems related to a negative perceived work environment of employees can enhance the risk of health problems. In a study examining the impact of employment and unemployment on psychological health and well-being, higher levels of health risks were found in workers who were dissatisfied with their work than in workers satisfied with their work or in the unemployed.[11] Moreover, especially awareness about the perception of employees of their work environment, also referred to as psychosocial work characteristics (among which demands of the work, control over the work and social support at work), on the presence of mental health problems,[12-14] but also on physical illness[12] has increased over the last decade. In turn, having an ill health can affect the ability of an employee to function in his or her work environment, as demonstrated by studies indicating that both a negative perception of the work environment and the presence of health problems predicted later sickness absence.[15-18] Consequently, help seeking behaviour in the

working population might be associated with not only the presence of mental health problems, with long-term diseases with a more somatic character and with fatigue, but also with interrelations between these health problems and the perception of the work environment as well.

In the Dutch health care system, the GP is equipped to provide care for employees experiencing problems in the working situation. Resulting from their function as gatekeepers, GPs are in a good position to support or treat health problems of their employed patients or take care of referral to other professionals in the field of more specialised health care or occupational medicine, when the problems experienced by the employee have a strong work-related component. When an employee experiences health problems in the form of everyday and non-disabling conditions but does not consult the doctor, this does not have to result in further and more serious health problems for the employee. In contrast, when disabling health problems with a more chronic character are involved, not visiting the GP may be more likely to have a negative impact on the health of the employee, especially when a negative perception of the work environment is also present. By not visiting the GP, those employees are consequently deprived of help from the GP in the form of support, treatment or referral to other professionals. It is therefore relevant to know whether employees who do not visit the GP do experience work-related psychosocial problems or health problems for which support or treatment by the GP would be available or could benefit from referral to other professionals in the field of work and/or health.

The aim of this study was to evaluate whether employees who visited the GP in relation with work differed from employees who did not visit the GP in relation with work, with regard to their psychosocial work characteristics and the presence of health problems. Within the framework of a large cohort study about fatigue at work (n=12,029), we had the unique opportunity to evaluate not only the perception of employees of their work environment, but also the presence of long-term diseases with a somatic character or somatic elements, mental health problems, and prolonged fatigue.

METHOD

Study population

Since May 1998, the Maastricht Cohort Study on Fatigue at Work is being conducted in The Netherlands. Self-report questionnaires were used to collect data on work-related, non-work-related and individual factors possibly associated with

fatigue. In the present study, data from the baseline cohort survey were used. Employees (n=26,978; aged 18-65 years) from 45 companies and organisations received the baseline questionnaire from the cohort study at their home address in May 1998. In an accompanying letter explaining the purpose and general outline of the cohort study, it was emphasised to the employees that their responses would be treated as confidential and would not be reported to their employers. A total of 12,161 employees (45%) completed and returned the questionnaire. Full detailed information about the baseline characteristics and the non-response analysis have been described elsewhere.[19,20] After data cleaning, the total baseline population consisted of 12,140 employees, of whom 12,029 employees (99.1%) answered the question 'Did you visit the GP in relation to your work during the past four months?' with 'yes' or 'no' and were therefore included. Employees who answered this question with 'yes' are referred to as VISITORS (n=1653), while employees who answered with 'no' are referred to as NON-VISITORS (n=10,376).

Measurements

Health problems

To determine level of fatigue, the self-report Checklist Individual Strength (CIS) was used.[21-23] This multidimensional questionnaire consists of 20 items covering several aspects fitting in the concept of prolonged fatigue (e.g. lack of concentration, fatigue severity). Subjects are instructed to indicate how they felt during the last two weeks. The response to each statement is scored on a seven-point Likert scale, varying from 'yes, that is true' to 'no, that is not true'. A higher CIS-total score (range: 20-140) indicates a higher level of prolonged fatigue. The cronbach's alpha coefficient was 0.93. For use in the working population, a cut-off point for fatigue with a specificity of 90% and a sensitivity of 73% was also developed in a pilot study.[24] Using this cut-off point, all those employees scoring >76 were designated as probable fatigue cases.

To determine presence of at least one long-term disease, the employees reported whether they had one or more of an extensive list of chronic conditions with a somatic character or with somatic elements (box 1). A Dutch translation of the 12-item version of the General Health Questionnaire (GHQ-12)[25,26] was used to measure level of likelihood of having a mental illness. The GHQ-12 (with a range of 12-48, when using the Likert scoring method) was developed as a screening instrument for detecting minor psychiatric disorders in the general population, especially depression and anxiety. The cronbach's alpha coefficient was 0.89. When applying the traditional scoring method of the GHQ-12 (range 0 to 12), a cut-off point also used in other working populations[27,28] is available. Using this cut-off point which is characterised as being a high threshold, all those employees scoring at least 4 were viewed as probable mental health problem cases.

Box 1 – The presence of at least one long term disease

All cohort participants indicated at baseline whether one or more of the following long term diseases was present:
1. Chronic obstructive pulmonary disease (i.e., asthma or chronic bronchitis)
2. Rhinitis or sinusitis
3. Heart disease or hypertension
4. Stroke
5. Ulcer
6. Chronic intestinal problems
7. Gall bladder problems
8. Cirrhosis or hepatitis
9. Kidney problems
10. Diabetes
11. Thyroid gland problems
12. Chronic back pain
13. Rheumatoid arthritis
14. Epilepsy or multiple sclerosis
15. Migraine or severe headache
16. Chronic skin disease or eczema
17. Cancer
18. Severe consequences of an accident, for example, burns or fractures

Psychosocial work characteristics

We used three subscales of the Dutch version of the Job Content Questionnaire (JCQ) to measure the perception of employees of their work environment.[29,30] The scale psychological job demands (5 items) relates to demands of the job, time pressure and conflicting demands. The cronbach's alpha coefficient was 0.69. The scale decision latitude (9 items) assesses the level of skill and creativity required on the job and flexibility permitted the worker in deciding what skills to employ and the organisationally mediated possibilities for workers to make decisions about their work. The cronbach's alpha coefficient was 0.82. The scale social support (8 items) contains items about supervisors' concern for the welfare of subordinates and co-workers' competence and helpfulness. The cronbach's alpha coefficient was 0.79. The responses on the items of the scales are scored on a four-point Likert scale, varying from 'strongly disagree' to 'strongly agree'. After scale construction, the range of the scales psychological job demands, decision latitude and social support were 12-48, 24-96 and 8-32 respectively. Analogue to analyses in other working populations,[15,31] scores on the scales were dichotomised using the median scores (34 for psychological job demands, 72 for decision latitude and 23 for social support).

Sociodemographic characteristics

The respondents also provided information about sociodemographic variables gender, age, educational level (low/middle/high) and living situation (living alone yes/no). In this study, these variables were included as potential confounders.

Statistical analyses

All data analyses were done with SPSS statistical software for Windows, version 10.0. Two-tailed t-tests (for continuous variables) and chi-square tests (for dichotomous /categorical variables) were used to test univariate differences between NON-VISITORS and VISITORS. To test multivariate differences between NON-VISITORS (the reference group) and VISITORS with respect to health problems and psychosocial work characteristics, two multivariate logistic regression analyses were conducted. In the first analysis, each health and work variable was adjusted for the sociodemographic variables (gender, age, educational level and living situation). Next, to be able to take the influence of health problems on the perception of the work environment and vice versa into account, all variables measuring health problems (fatigue, long-term diseases, mental illness), psychosocial work characteristics (job demands, decision latitude, social support) and the confounders were placed into a regression model in one block. To prevent the occurrence of multicollinearity (present when variables correlate too highly, i.e. referring to intercorrelations of at least 0.80), Pearson intercorrelations between all study variables were checked beforehand and were not found to cause possible multicollinearity problems. Except for $r=0.62$ for fatigue and mental illness, intercorrelations ranged from to $r=0.01$ to $r=0.36$. In the multivariate analyses, Odds Ratios (ORs) are presented together with their 95% Confidence Intervals (95% CI). To enhance interpretation of the ORs, dichotomised scores were used for all study variables.

RESULTS

Table 1 shows the means and frequencies for sociodemographics and variables under study for the NON-VISITORS (n=10,376) and VISITORS (n=1653). When compared to VISITORS on a univariate level, a significant ($p<0.001$) lower percentage of NON-VISITORS indicated having at least one long-term disease, and NON-VISITORS were also found to report a significant higher educational level, a lower level of fatigue, and lower likelihood of having a mental illness. For the NON-VISITORS, prevalences of fatigue and likelihood of having a mental illness were 18.1% and 18.9% respectively, while for the VISITORS these prevalences were 45.3% and 49.6% respectively (specific results not presented). With respect to psychosocial work characteristics, NON-VISITORS reported a more positive perception of their work environment, indicated by a lower level of psychological job demands and higher levels of decision latitude and social support at work. To a lesser extent ($p<0.05$), a lower percentage of NON-VISITORS than

VISITORS lived alone, and the mean age of the NON-VISITORS was slightly lower (0.8 years; $p<0.01$) than the mean age of the VISITORS.

In table 2, the two multivariate logistic models are presented. The first model incorporates the health problems and psychosocial work characteristics adjusted for the sociodemographics gender, age, educational level and living situation. In this model, all health problems and psychosocial work characteristics were associated with having visited the GP in relation with work.

Table 1 – Descriptive characteristics of VISITORS (employees who indicated having visited the GP in relation to work during the last four months) and of NON-VISITORS (employees who indicated not having visited the GP in relation to work during the last four months)

Variable	VISITORS (n=1653) Frequency/Mean (sd)	NON-VISITORS (n=10,376) Frequency/Mean (sd)
Sociodemographics		
Gender: % female	26.8%	26.9%
Age (in years) **	41.7 (9.3)	40.9 (8.9)
Highest level of education		
-Low	34.8%	17.8%
-Medium	46.9%	45.2%
-High	18.4%	36.9%
Living alone: yes (versus no) *	11.8%	9.9%
Health problems		
Presence at least one long-term disease ***:		
- Yes (versus no)	46.7%	21.3%
Fatigue (CIS total score) ***	73.7 (25.3)	54.6 (22.4)
Likelihood of mental illness ***		
(GHQ-Likert total-score)	27.6 (7.2)	23.0 (4.7)
Work-related psychosocial factors		
(JCQ total-score per scale)		
-Job demands ***	35.1 (6.0)	33.0 (5.6)
-Decision latitude ***	66.3 (12.7)	72.5 (11.0)
-Social support ***	21.1 (3.7)	22.5 (3.1)

CIS = Checklist Individual Strength; GHQ-Likert = General Health Questionnaire, Likert-score; JCQ = Job Content Questionnaire.
t-test/Chi-square test, *p<.05; **p<.01; ***p<.001.

In the second multivariate logistic model (see table 2), additional adjustment took place for all health problems and psychosocial work characteristics measured for each study variable. As indicated by the results from this full model, all health problems and psychosocial work characteristics were still associated with having

visited the GP in relation with work, although all ORs - and especially those of fatigue and likelihood of having a mental illness - were reduced in size. Employees who reported at least one long-term disease had 2.44 times higher odds than employees who did not report any long-term diseases. Employees who were considered to be a probable fatigue case or a probable mental health case had 87% higher odds and odds were 2.50 higher for having visited the GP in relation with work than those not considered being a fatigue case or a probable mental health case, respectively. For the psychosocial work characteristics, employees with a higher level of psychological job demands and a lower level of decision latitude had 46% higher odds for having visited the GP in relation with work than those with a lower level of psychological job demands and a higher level of decision latitude, respectively. Employees with a lower level of social support as compared to employees with a higher level of social support had 25% higher odds for having visited the GP in relation with work.

Using dichotomised scores for all health and work variables may imply losing relevant information. As we had continuous scores available regarding level of fatigue, likeliness of having a mental illness and the psychosocial work characteristics, we conducted both multivariate logistic regression analyses again, but this time using continuous scores for these study variables. Again, NON-VISITORS were still found to differ significantly (all variables $p<0.001$, except social support at work $p=0.01$) from VISITORS with regard to all health and work variables measured.

Table 2 – Logistic regression of health problems and psychosocial work characteristics on VISITORS (employees who indicated having visited the GP in relation to work during the last four months) compared to NON-VISITORS (employees who indicated not having visited the GP in relation to work during the last four months)

Variable		OR 1 (95% CI)	OR 2 (95% CI)
Health problems			
Fatigue	Case	3.61 (3.22-4.05)***	1.87 (1.63-2.14)***
	Non-case	1	1
Likelihood of having a mental illness	Case	4.11 (3.66-4.61)***	2.50 (2.18-2.86)***
	Non-case	1	1
Presence at least one long-term disease	Yes	3.02 (2.69-3.38)***	2.44 (2.15-2.77)***
	No	1	1
Psychosocial work characteristics			
- Psychological job demands	High	1.83 (1.64-2.05)***	1.46 (1.29-1.65)***
	Low	1	1
- Decision latitude	Low	1.91 (1.70-2.15)***	1.46 (1.28-1.67)***
	High	1	1
- Social support	Low	1.80 (1.61-2.01)***	1.25 (1.10-1.42)**
	High		

OR = Odds Ratio; 95% CI = 95% Confidence Interval; OR1 = OR adjusted for gender, age, educational level, and living situation; OR2 = OR1 + the other health problems and psychosocial work characteristics in the model.**p<.01, ***p<.001.

DISCUSSION

This study aimed at evaluating the perception of the work environment and the presence of health problems in employees who did not or did visit the GP in relation to work (NON-VISITORS versus VISITORS respectively). Compared to VISITORS, a lower percentage of NON-VISITORS reported the presence of at least one long-term disease, and NON-VISITORS also reported a lower level of fatigue, a lower likelihood of having a mental illness and a more positive perception of their work environment in the form of a lower level of psychological job demands and higher levels of decision latitude and social support at work.

Our findings that health problems were associated with visiting the GP in relation with work after adjustment for sociodemographics, are in line with studies in the general population examining associations between health and seeking care,[2-5] despite differences in study population, in operationalisation of the health problems measured and in type of help seeking behaviour studied. To our knowledge, this is the first study conducted in a working population examining psychosocial work characteristics and health problems simultaneously in association with visiting or not visiting the GP in relation to work. The cross-sectional character of the study makes it impossible to investigate whether psychosocial work characteristics merely influence the health status of an employee or vice versa, whether the work and health problems measured caused seeking care in relation to work, and whether visiting the GP in relation to work was the cause of the health and work problems, for example via the prescription of medication.[3-5] Despite this limitation, the results of this study imply that mutual relations between work and health variables are important to take into account when studying factors associated with visiting the GP in relation with work in a working population.

Of the three health problems studied, presence of fatigue and likelihood of having a mental illness may be less likely than presence of at least one long-term disease to be associated with visiting the GP in relation to work. It may be suggested that, compared to having a long-term condition, employees may experience fatigue as belonging more to daily and working life and mental health problems as more difficult to report to a doctor in general, because of fear of stigmatisation or embarrassment.[32] In contrast with this suggestion, however, we found that all three health variables were less present in employees who did not visit the GP in relation with work after adjustment for sociodemographic variables. On the other hand, the finding that the decrease in the Odds Ratio was less high for presence of at least one long-term disease than the decrease for fatigue and likelihood of having a mental illness when taking into account influence of all work and health variables studied, seems to support this suggestion. Moreover, these results also show the

importance of paying attention to the interrelationship of health problems and psychosocial work characteristics.

The data presented in this study come from a large-scale self-report study in a working population. Although more specific information about the exact reason for consulting the GP was not available, this study was valuable in enabling us to examine whether perceptions of employees of their work environment and their health were related to reporting having visited or not having visited the GP in relation with work. The response rate of this study was 45%. Although selective participation of employees cannot be ruled out, this response rate is in line with other large-scale studies conducted in working populations. As the total population comprises more than 12,000 employees, even small differences between VISITORS and NON-VISITORS lead to statistically significant results. However, the results found might also be considered as clinically relevant as the Odds Ratios of all health and work variables studies turned out to be relevant even after adjustment for sociodemographics and for each other.

In conclusion, our finding that employees who did not visit the GP in relation to work report a more positive perception of their work environment and experience lower levels of health problems than employees who visited the GP in relation to work, reassures the GP that the working population he or she does not see, seems to have less reasons to visit than employed patients who visit in relation with work. Furthermore, the results from this study also show that psychosocial work characteristics are associated with health problems on the one hand, but also have an effect independently from health problems on the other hand, when studied in association with visiting the GP in relation with work. Consequently, professionals in the field of occupational medicine could be of importance in advising the GP in taking care of the health of employees consulting in relation to work.

ACKNOWLEDGEMENTS

As a part of the Maastricht Cohort Study on Fatigue at Work, this study participates in The Netherlands concerted research action on 'Fatigue at Work' and is granted by The Netherlands Organization for Scientific Research (NWO grant no. 580-02.255, part I).

REFERENCES

1. Kooiker SE. Exploring the iceberg of morbidity: a comparison of different survey methods for assessing the occurence of everyday illness. Soc Sci Med 1995;41:317-32.
2. Corney RH. Sex differences in general practice attendance and help seeking for minor illness. J Psychosom Res 1990;34:525-34.
3. Krasnik A, Hansen E, Keiding N, Sawitz A. Determinants of general practice utilization in Denmark. Dan Med Bull 1997;44:542-6.
4. Al-Windi A, Dag E, Kurt S. The influence of perceived well-being and reported symptoms on health care utilization: A population-based study. J Clin Epidemiol 2002;55:60-6.
5. Kolk AMM, Hanewald GJFP, Schagen S, Gijsbers van Wijk CMT. Predicting medically unexplained physical symptoms and health care utilization; a symptom-perception approach. J Pyschosom Res 2002;52:35-44.
6. Williams SJ, Calman M. Key determinants of consumer satisfaction with general practice. Fam Pract 1991;8:237-42.
7. Meijman TF. Over vermoeidheid: arbeidspsychologische studies naar beleving van belastingeffecten (Fatigue: studies on the perception of workload effects). Amsterdam: University of Amsterdam; 1991.
8. Tiesinga LJ, Dassen TWN, Halfens RJH. Fatigue: A summary of the definitions, dimensions, and indicators. Nurs Diagn 1996;7:51-62.
9. Ridsdale L, Evans A, Jerrett W, et al. Patients with fatigue in general practice: a prospective study. BMJ 1993;307:103-6.
10. McMichael AJ, Spirats R, Kupper LL. An epidemiological study of mortality within a cohort of rubber workers, 1964-72. J Occup Med 1986;18:165-8.
11. Graetz B. Health consequences of employment and unemployment: longitudinal evidence for young men and women. Soc Sci Med 1993;36:715-24.
12. Muntaner C, Schoenbach C. Psychosocial work environment and health in U.S. metropolitan areas: a test of the demand-control and demand-control-support models. Int J Health Serv 1994;24:337-53.
13. Stansfeld SA, Fuhrer R, Head J, Ferrie J, Shipley M. Work and psychiatric disorder in the Whitehall II study. J Psychosom Res 1997;43:73-81.
14. Niedhammer I, Goldberg P, Leclerc A, Bugel I, David S. Psychosocial factors at work and subsequent depressive symptoms in the Gazel cohort. Scand J Work Environ Health 1998;24:197-205.
15. Niedhammer I, Bugel I, Goldberg M, Leclerc A, Guéguen A. Psychosocial factors at work and sickness absence in the Gazel cohort: a prospective study. Occup Environ Med 1998;55:735-41.
16. North FM, Syme SL, Feeney A, Shipley M, Marmot M. Psychosocial work environment and sickness absence among British civil servants: the Whitehall II study. Am J Public Health 1996;86:332-40.
17. Smulders PGW, Nijhuis FJN. The Job Demands-job control model and absence behaviour: results of a 3-year longitudinal study. Work Stress 1999;13:115-31.

18. Voss M, Floderus B, Diderichsen F. Physical, psychosocial, and organisational factors relative to sickness absence: a study based on Sweden Post. Occup Environ Med 2001;58:178-84.
19. Kant IJ, Beurskens AJHM, Schroër CAP, et al. De Maastrichtse Cohort Studie naar langdurige psychische vermoeidheid in de arbeidssituatie (The Maastricht Cohort Study of prolonged Fatigue at Work). Tijdschrijft voor bedrijfs- en verzekeringsgeneeskunde 2000;8:226-32.
20. Bültmann U, Kant IJ, Kasl SV, Beurskens AJHM, van den Brandt PA. Fatigue and psychological distress in the working population: psychometrics, prevalence and correlates. J Psychosom Res 2002;52:445-52.
21. Vercoulen JH, Swanink CM, Fennis JF, et al. Dimensional assessment of chronic fatigue syndrome. J Psychosom Res 1994;38:383-92.
22. Vercoulen JHHM, Alberts M, Bleijenberg G. De Checklist Individuele Spankracht (CIS) (The Checklist Individual Strength (CIS)). Gedragstherapie 1999;32:131-6.
23. Beurskens AJHM, Bültmann U, Kant IJ, et al. Fatigue among working people: validity of a questionnaire measure. Occup Environ Med 2000;57:353-7.
24. Bültmann U, De Vries M, Beurskens AJHM, et al. Measurement of prolonged fatigue in the working population: determination of a cut-off point for the Checklist Individual Strength. J Occup Health Psychol 2000;5:411-16.
25. Goldberg DP, Williams P, A user's guide to the General Health Questionnaire. Windsor: NFER-Nelson, 1988.
26. Koeter MWJ, Ormel J, General Health Questionnaire; Nederlandse bewerking (General Health Questionnaire manual, Dutch version). Lisse: Swets & Zeitlinger, 1991.
27. Hardy GE, Shapiro DA, Borrill CS. Fatigue in the workforce of national health service trusts: levels of symptomatology and links with minor psychiatric disorder, demographic, occupational and work role factors. J Psychosom Res 1997;43:83-92.
28. Wall TD, Bolden RI, Borrill CS, et al. Minor psychiatric disorder in NHS trust staff: occupational and gender differences. Br J Psychiatry 1997;171:519-23.
29. Karasek R, Job content questionnaire and users's guide. Los Angeles, CA: University of South California: Department of Industrial and Systems Engineering, 1985.
30. Houtman I. Reliability and validity of the Dutch version of the Karasek Job Content Questionnaire.APA/NIOSH conference on Work, Stress and Health. Washington, DC: American Psychiatric Association, 1995.
31. North F, Lyme S, Feeney A, et al. Explaining socioeconomic differences in sickness absence: the Whitehall II study. BMJ 1993;306:361-6.
32. Sims A. The scar that is more than skin deep: the stigma of depression. Br J Gen Pract 1993;43:30-1.

Help-seeking behaviour of employees: a prospective study on health problems and psychosocial work characteristics as antecedents of consulting a physician in relation to work

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Submitted for publication

ABSTRACT

Objectives
This study aimed to examine whether health problems and psychosocial work characteristics of employees were independently prospectively related to consulting a physician in relation to work in a Dutch working population. Since employees experiencing problems in their working situation can choose to consult without referral either the General Practitioner (GP) or the Occupational Physician (OP), the focus was on predictors of consulting the GP or OP in relation to work.

Methods
Within the framework of the large-scale prospective epidemiological Maastricht cohort study of "Fatigue at Work", consisting of self report questionnaires, longitudinal regression analyses were used to study health problems (prolonged fatigue, mental health problems, chronic conditions), and psychosocial work characteristics (psychological job demands, decision latitude, social support, physical musculoskeletal demands, emotional demands, work-family conflict) as predictors of visiting the GP or OP in relation to work four to eight months later, taking into account interrelations between these health-related and work-related variables and confounding factors (sociodemographics, coping style).

Results
The results indicate that independent prospective associations with consulting a physician in relation to work were present in terms of health problems, physical and emotional demands at work, and work-family conflict, but not in terms of psychological job demands, decision latitude and social support at work. In terms of the direction of the help-seeking behaviour, none of the health-related and work-related predictors were exclusively associated to visiting the OP instead of the GP. Contrary, emotional demands at work and work-family conflict were exclusively associated to visiting the GP instead of the OP.

Conclusions
In conclusion, results of our study suggest that both health problems and psychosocial work characteristics can independently be prospectively associated to consulting a physician in relation to work. Regarding the direction of the help-seeking behaviour, consulting the GP instead of the OP seems more likely to be preceded by indicators of work-related problems relatively more difficult to objectify than indicators of work-related problems relatively less difficult to objectify.

INTRODUCTION

In terms of preventing loss of productivity of the working population, guarding the work ability of employees is of paramount importance. Employees that experience problems in their working situation and stay frequently and/or a longer period away from work, will automatically get in touch with (occupational) health care professionals who can be involved in interventions aiming to enhance the work ability of employees, and to promote return to work. However, employees can already have experienced problems in the working situation before absenteeism has occurred. These employees are not obliged to consult an (occupational) health care professional, but can instead consult one on their own initiative. Paying attention to characteristics of employees who are still at work but nevertheless seek help, can provide information possibly useful for the development of strategies aiming to help employees to stay at work and consequently reduce or even prevent loss of productivity. However, studies about characteristics of users of (occupational) health care have as yet not been conducted specifically in the working population.

In general, help-seeking behaviour of individuals is known to be a complex process, with direct and mediating influences from a broad range of health-related, cultural and social factors.[1-3] Within the broad range of variables associated with help-seeking behaviour, health problems have been found to play a prominent role in relation to consulting a physician, in terms of the presence of chronic illnesses,[4-8], level of perceived health[4,9-13] and number of physical and/or mental symptoms.[5,8,13-16] Furthermore, sociodemographic characteristics such as gender, age, educational level and living situation were also found to be related to help-seeking behaviour in the general population.[4,6,17-19] Within the field of health-related factors, the nature of health problems may have an effect on the help-seeking behaviour of an individual. Compared to health problems with a somatic character, problems related to mental health are more likely to provoke fear of stigmatisation or embarrassment in the patient.[20] Consequently, the presence of mental health problems themselves may not automatically urge the need to consult a physician. Related to this, about one-third of the general population thinks not to be able to discuss personal problems with a GP,[21] despite the high prevalence of this type of problems in the general population. Within the field of prevalent somatic and mental health problems, fatigue is a complaint that is found to be associated to not only a wide range of somatic conditions,[22] but also to mental health problems (especially in the form of depression and/or anxiety).[23-25] Although fatigue can represent a symptom with an acute and reversible character that is likely to be present as a normal reaction to for example a viral infection or strenuous activities, it can turn into a more serious health problem when it becomes persistent or when compensation mechanisms for the reduction of

fatigue (e.g. taking more rest) are not effective anymore.[26] Consequently, studying fatigue with a prolonged character may also be relevant to examine as a health problem in association to help-seeking behaviour. However, it has as yet not been studied whether prolonged fatigue does or does not have an independent effect on help-seeking behaviour in the general population, taking into account associations with both somatic and mental health problems.

A substantial part of the general population is employed (approximately 65% in the Netherlands). In the last decade, several studies in working populations have indicated that psychosocial work characteristics are related to not only mental health problems (for example[27-29]), but to somatic health problems, (for example[27]) and to fatigue[30] as well. In turn, ill health can affect the ability of an employee to function in his or her work environment, as demonstrated by studies indicating that psychosocial work characteristics and health problems both predicted incident sickness absence.[31-35] Besides these complex and reciprocal relationships between psychosocial work characteristics and health problems, demands at work have also been found to be associated to a perceived interference between family and work roles.[36,37] In turn, this interference has been found to be associated to health problems, among which fatigue.[37,38] Consequently, an even more complex relation between health problems and consulting a physician might be present in the working population when compared to the general population. Help-seeking behaviour in the working population might not only be associated with the presence of mental health problems, somatic conditions and prolonged fatigue, but also with psychosocial work characteristics, and with interrelations between these health-related and work-related variables as well. However, insight in the effect of health-related and work-related variables on help-seeking behaviour of the working population is still lacking. Both health problems and psychosocial work characteristics have at yet not been studied specifically in relation to help-seeking behaviour in the working population, and studies examining help-seeking behaviour of the general population predominantly took place on a cross-sectional level. Prospective studies provide the opportunity to study whether health and work variables have an independent longitudinal effect on consulting a physician in the working population. In terms of longitudinal effects of work variables on consulting a physician, it has also as yet not been examined whether psychosocial work characteristics directly influence help-seeking behaviour of the working population, or whether their effect takes place via health-related variables. Since both health-related and work-related variables have been found to possibly reduce the work ability of employees, direct relations between psychosocial work characteristics environment and help-seeking behaviour may be expected in particular in employees consulting a physician in relation to work.

Employees active at work but experiencing health-related or work-related problems in their working situation may consider to visit their General Practitioner (GP) or Occupational Physician (OP) on their own initiative, as both physicians have open consulting hours for their patients and for the employees of their company, respectively. As a consequence of their role as gatekeepers for the general population, which also includes the working population, GPs have an overview of the health status of their patients and the social context they live in and are in a good position to treat health problems of their employed patients, or to take care of referral to other professionals. When feeling the need to do so, employees are free to take the initiative to visit the GP in relation to work. From 1998 on, every Dutch company or organisation must provide access to an OP for its employees. Consequently, Dutch workers experiencing health-related and/or work-related problems nowadays not only have access to a GP, but also to an OP. In the Netherlands, OPs can be consulted by employees who are active at work (thus not at sick leave) but nevertheless experience problems in their working situation. Within these employees, OPs are likely to have a good insight in characteristics of employees' their work and can therefore help to gather information that is useful when taking care of support or referral for these employees when the work ability of employees may be in danger.

The objective of this study was to examine whether health problems and psychosocial work characteristics can be identified as independent predictors of help-seeking behaviour in the working population. Within the framework of the Maastricht Cohort Study on "Fatigue at Work", a large-scale epidemiological prospective cohort study in the working population, we were able to study whether indicators of health problems and psychosocial work characteristics were prospectively related to help-seeking behaviour of employees - in the form of consulting a physician in relation to work - while taking into account other factors known to be associated with help-seeking behaviour of the general population. Regarding the direction of the help-seeking behaviour of employees, we examined whether health-related and work-related variables played another role in consulting the GP in relation to work than in consulting the OP in relation to work.

METHOD

Study population

A large-scale epidemiological longitudinal cohort study addressing a broad range of work-related, non-work-related and individual factors possibly associated with fatigue at work, was conducted in The Netherlands between May 1998 and January 2001. The Maastricht Cohort Study on "Fatigue at Work" consisted of nine self-

report questionnaires (two short questionnaires and one extensive questionnaire per year) with a four monthly-interval, and prospectively surveyed a baseline population of over 12,140 employees from 45 different companies and organisations. Full details of the design of the cohort study, characteristics of the baseline study population and a non-response analysis have been described elsewhere.[39-41] In May 2000, (two years after the baseline measurement), information was available from 8070 employees (a response of 70%), which were used as the baseline population under study here. Of these employees, we excluded those employees not actively at work (n=500) or those with an unknown working status (n=100), as we wanted to focus on employees with an active working status. Of this final study population (n=7470), 92% (n=6869) indicated having or not having visited the GP or OP in relation to work over a period of four months in the questionnaire of May 2000 and in the questionnaire of January 2001.

Measurements

Visiting the GP or OP in relation to work

In both the cohort questionnaires of May 2000 and January 2001, cohort participants answered the question 'Did you visit the GP in relation to your work during the past four months?' with 'yes' or 'no' as the reply options. The same question was asked regarding the OP. By combining these two questions in the cohort questionnaire of January 2001, we constructed an outcome variable consisting of three groups: 1) employees who indicated having visited nor the GP, neither the OP in relation to work (n=5931; 86.3% of the total study population, from now on referred to as non-visitors), and 2) employees who indicated having visited only the GP in relation to work during the past four months (n=317; 4.6%; from now on referred to as visitors of only the GP) or 3) only the OP in relation to work during the past four months (n=259; 3,8%; from now on referred to visitors of only the OP). As we wanted to examine whether health problems and psychosocial work characteristics had a differential effect on visitors of only the GP or visitors of only the OP, we excluded employees who indicated having visited both GP and OP in relation to work (n=362; 5.3%).

Indicators of health problems

To determine the level of fatigue, the self report Checklist Individual Strength (CIS) was used.[42-44] This multidimensional questionnaire consists of 20 items covering several aspects fitting the concept of prolonged fatigue (e.g. lack of concentration, fatigue severity). Subjects are instructed to indicate how they felt during the last two weeks. The response to each statement is scored on a seven point Likert scale, varying from 'yes, that is true' to 'no, that is not true'. A higher CIS total score (range: 20-140) indicates a higher level of fatigue with a prolonged character (from now on referred to as fatigue). To be able to determine the

prevalence of fatigue in the total working population, a cutoff point for fatigue for use in the working population was developed in a pilot study.[42] Using this cutoff point, all those employees scoring >76 are designated as probable fatigue cases, with a fatigue level that can be indicated as putting the employee "at risk" for sick leave or work disability. To determine the presence of at least one chronic condition, the employees reported whether they had one or more of an extensive list of long-term conditions,[45] including heart problems, stroke, live problems, diabetes, cancer, respiratory disorders, metabolic disorders, skin disorders, chronic back pain, and severe consequences of an accident (for example, fractures). A Dutch translation of the 12-item version of the General Health Questionnaire (GHQ-12)[46,47] was used to measure the level of likelihood of having a mental health problem. The GHQ-12 (with a range of 12-48, when using the Likert scoring method) was developed as a screening instrument for detecting minor psychiatric disorders in the general population, especially depression and anxiety. When using the traditional scoring method of the GHQ-12 (with a range of 0-12), a cutoff point which has been used in other working populations[48,49] is available. Using this cutoff point implies that all employees scoring at least 4 were viewed as probable mental health problem cases. As this cutoff point represents a relatively high threshold score, employees that reach this score can be perceived as being likely to experience mental health problems.

Psychosocial work characteristics

We used three subscales of the Dutch version of the Job Content Questionnaire (JCQ) to measure the perception of employees of characteristics of their psychosocial work environment.[50,51] The scale 'psychological job demands' (5 items), also referred to as workload, relates to the extent of excessive work, conflicting demands, insufficient time for work, having to work fast, and having to work hard. The scale 'decision latitude' (9 items), assesses the level of skill and creativity required on the job and flexibility permitted the worker in deciding what skills to employ and the organizationally mediated possibilities for workers to make decisions about their work. 'Social support' (8 items) contains items about supervisors' concern for the welfare of subordinates and co-workers' competence and helpfulness. The responses on the items of the scales are scored on a four point Likert scale, varying from 'strongly disagree' to 'strongly agree'. After scale construction, the range of the scales psychological job demands, decision latitude and social support were 12-48, 24-96 and 8-32 respectively. We also measured how physical demanding the employees found their work using the sum of five items from two Dutch questionnaires (three items from the Dutch Questionnaire on Work and Health[52] and two items from the Dutch Musculoskeletal Questionnaire of the Musculoskeletal System.[53] This physical demands at work subscale in particular measures demands regarding the musculoskeletal system (physical demanding work, work that requires the same posture over a long time, difficult

postures, repeating measurements over a long time, carrying or lifting heavy weights). To measure emotional demands at work, items from a Dutch questionnaire about perception and judgement of work (about being confronted with personally upsetting things, being personal attacked or threatened, getting annoyed about others, about moving work situations),[54] and one self-formulated item (about one or more shocking events at work during last year) were combined into one subscale (consisting of the sum of five items). The possible presence of a work-family conflict (yes or no), was measured via the self formulated and within the Maastricht Cohort Study validated question 'Are you able to adequately combine work and family life?'.[38] To enhance comparison between the health and work variables, scores on the continuous variables were also categorised. Tertile splits were used for psychological job demands and decision latitude at work and median splits were used for social support, physical demands and emotional demands at work.

Sociodemographic variables and coping

Several variables were included in the analyses as potentially confounding the relation between the health and work variables and visiting the GP and/or OP in relation to work. Besides sociodemographics age, gender, educational level (low, middle or high), living situation (living alone yes or no), we also measured the tendency to use one of four coping styles that may be related to help-seeking behaviour via a 15-item Dutch coping questionnaire (UCL-15)[55]: seeking social support (5 items, range 5-15), active problem solving (5 items, range 5-15), avoidance (3 items, range 3-9) or palliative reaction (2 items, range 2-6).

Statistical analyses

All data analyses were performed using SPSS, version 10.0 for Windows,[56] and all statistical tests were two-tailed. Employees with incomplete data were excluded from the analyses. All health problems and psychosocial work characteristics were examined as predictors of consulting the GP or OP in relation to work. For all health and work predictors, sociodemographics and coping styles, univariate differences between non-visitors, visitors of only the GP and visitors of only the OP were examined using ANOVA tests for continuous variables and Chi Square tests for categorical variables. When comparing non-visitors, visitors of only the GP and visitors of only the OP to one another, adjustment for multiple testing took place by only taking into account differences of at least $p<0.01$. Post hoc multiple comparisons in the ANOVA analyses took place via Hochberg's GT2, as a large difference was present between the sample size of the non-visitors in comparison to sample sizes of visitors of only the GP and visitors of only the OP.

Multiple logistic regression analyses were used to test prospective multivariate differences between the non-visitors (the reference group) and visitors of only the GP or visitors of only the OP (as measured in January 2001). For all health and work predictors (as measured in May 2000), Odds Ratios (ORs) with their 95% Confidence Intervals (95% CI) are presented. Four different models were used to present the results of the health problems and psychosocial work characteristics as predictors of visiting the GP or the OP in relation to work. In model 1, each separate health problem and psychosocial work characteristic was adjusted for age, gender, educational level, living situation, and coping style). Model 2 examines each separate health problem as a predictor after adjustment for the other health problems, sociodemographics and coping style. Analogue to model 2, model 3 includes each separate psychosocial work characteristic as a predictor after adjustment for the other psychosocial work characteristics, sociodemographics and coping style. Model 4 incorporates all predictors and is a fully adjusted model, meaning that each separate health problem and psychosocial work characteristic is not only adjusted for sociodemographics and coping style, but also for all other health problems and psychosocial work characteristics in the model. As this final regression model contains a large amount of independent variables, the presence of multicollinearity (referring to intercorrelations between the independent variables of at least 0.80) was checked beforehand, by means of checking the correlation matrix of all the independent variables. However, an indication for multicollinearity was not found.

In the multiple logistic regression models described above, we only focused on prevalent visitors. This implies that cross-sectional associations between having visited or not having visited a physician and scores on health problems and psychosocial work characteristics at the baseline measurement (May 2000) were not yet taken into account. As we additionally wanted to check the predictive effect of health problems and psychosocial work characteristics on consulting behaviour in incident visitors, we used the questionnaire of May 2000 to stratify for having visited versus not having visited the GP and/or OP in relation to work at the baseline measurement (in the form of visitors of only the GP or OP versus non-visitors), and conducted all multiple logistic regression analyses again.

RESULTS

In table 1, scores on health problems and psychosocial work characteristics, sociodemographics and coping styles four to eight months before having or not having visited the GP or OP in relation to work are shown for non-visitors, visitors of only the GP, and visitors of only the OP.

Table 1 - Scores on indicators of health problems, psychosocial work characteristics, sociodemographics and coping style eight months before employees indicated having visited nor GP, neither OP in relation to work during the past four months (Non-visitors), indicated having visited only the GP in relation to work during the past four months (Only the GP), or indicated having visited only the OP in relation to work during the past four months (Only the OP)

	Non-visitors (n=5931)	Only the GP (n=317)	Only the OP (n=259)
Variable	Mean (sd) / Frequency		
Health problems			
Fatigue (CIS) [a,b]	56.1 (23.5)	68.4 (24.4)	68.0 (26.6)
Probable case	21.6%	39.2%	39.5%
Mental health problems (GHQ-12) [a,b]	22.9 (4.6)	24.9 (5.9)	25.1 (5.6)
Probable case	18.6%	32.9%	34.7%
At least one chronic condition(% yes) [a,b]	18.0%	31.3%	33.2%
Psychosocial work characteristics			
Psychological job demands (JCQ) [a]	32.1 (5.4)	33.2 (5.8)	32.8 (5.7)
Highest tertile	29.0%	37.1%	36.4%
Decision latitude (JCQ) [a]	72.9 (10.1)	69.8 (10.9)	71.4 (10.6)
Lowest tertile	30.5%	44.1%	38.2%
Social support (JCQ) [a,b]	22.4 (3.0)	21.7 (3.5)	21.8 (3.4)
Below median	46.1%	56.5%	56.1%
Physical demands (% above median) [a,b]	44.1%	61.4%	55.6%
Emotional demands (% above median) [a,b,c]	51.9%	73.1%	60.4%
Work family conflict (% yes) [a,c]	7.8%	15.5%	12.4%
(Socio)demographics			
Gender (% female)	26.8%	25.6%	25.2%
Age (in years) [a,b]	41.4 (8.4)	42.5 (8.4)	42.7 (8.3)
Educational level [a,c]			
- Low	16.1%	26.4%	16.5%
- Medium	43.9%	45.9%	46.1%
- High	40.0%	27.7%	37.4%
Living alone (% yes)	7.6%	10.5%	8.9%
Coping (UCL-15)			
- Active problem solving	15.1 (2.5)	14.9 (2.8)	15.0 (2.5)
- Avoidance	5.6 (1.6)	5.9 (1.7)	5.6 (1.5)
- Social support seeking	10.9 (2.6)	10.7 (2.7)	10.9 (2.7)
- Palliative reaction [a,c]	4.0 (1.1)	4.2 (1.1)	4.0 (1.1)

CIS = Checklist Individual Strength; GHQ-12 = 12-item General Health Questionnaire; JCQ = Job Content Questionnaire; UCL-15 = 15-item Utrecht Coping List.

a,b,c: Same letter indicates statistically significant different pair for differences between groups (a) 'non-visitors' and 'only GP', (b) 'non-visitors' and 'only OP' and (c) 'only GP' and 'only OP' at $p<.01$, with ANOVA test for continuous variables, Chi-square test for categorical variables.

The univariate results in table 1 show that significant differences between visitors of only the GP, only the OP and non-visitors were found with respect to not only all the health problems and psychosocial work characteristics, but also with respect to sociodemographics age and educational level, and with respect to palliative reaction as a coping style. Although all these differences were significant on a statistical level, the clinical relevance of the differences regarding psychological job demands, decision latitude and social support at work, age and the palliative coping reaction was rather low, representing a difference of at most 5%. Regarding the significant health problems and psychosocial work characteristics, more indicators of health and work problems were found among visitors of only the GP and visitors of only the OP than among non-visitors. Post-hoc comparisons indicated that most differences were found between non-visitors and visitors of only the GP, and between non-visitors and visitors of only the OP. Almost no differences were found between visitors of only the GP and visitors of only the OP, except for percentage of employees scoring above the median of emotional demands at work, and percentage of employees with a low versus a high educational level. For these variables, the highest percentages were found among employees visiting the GP in relation to work.

Next, we examined multivariate differences between non-visitors, visitors of only the GP and visitors of only the OP. As most univariate differences were present between non-visitors and visitors of only the GP and between non-visitors and visitors of only the OP (see table 1), we focused the multiple logistic regression on differences between non-visitors and visitors of only the GP (table 2) and differences between non-visitors and visitors of only the OP (table 3).

As indicated by the results in table 2, all health problems and psychosocial work characteristics were prospectively associated with having visited or not having visited the GP in relation to work four to eight months later after adjustment for sociodemographics and coping style (model 1). Furthermore, each health problem was still prospectively associated to visiting the GP in relation to work four to eight months later after adjustment for the other health problems (model 2). After additional adjustment for the work variables (model 4), this prospective relation between each health problem and visiting only the GP was reduced but still significant for having a mental health problem and at least one chronic condition, and not significant anymore for being a probable fatigue case. Similar to the health problems, each separate psychosocial work characteristic was prospectively associated to visiting the GP in relation to work after adjustment for sociodemographics and coping style (model 1). However, another picture emerged for the separate psychosocial work characteristics after adjustment for the other psychosocial work characteristics (model 3). After this adjustment, reduced but still significant associations were limited to physical demands, emotional demands, and

presence of a work-family conflict. For all these three variables but in particular for emotional demands at work, associations remained significant after additional adjustment for the health problems (model 4).

Table 2– Multiple logistic regression of indicators of health problems and psychosocial work characteristics as predictors of having visited or not having visited only the GP in relation to work four to eight months later with having visited nor the GP, neither the OP in relation to work as the reference group (Visitors of only the GP versus Non-visitors)

Variable		Adj OR1 (95% CI)	Adj OR2 (95% CI)	Adj OR3 (95% CI)	Adj OR4 (95% CI)
Health problems					
Probable fatigue case	Yes	2.10 (1.61-2.74)	1.55 (1.14-2.09)	X	1.31 (0.96-1.78)
	No	1	1	X	1
Probable mental health problem case	Yes	2.12 (1.63-2.75)	1.62 (1.21-2.18)	X	1.49 (1.10-2.03)
	No	1	1	X	1
At least one chronic condition	Yes	1.81 (1.38-2.37)	1.56 (1.18-2.06)	X	1.45 (1.08-1.93)
	No	1	1	X	
Psychosocial work characteristics					
Psychological job demands	High	1.68 (1.22-2.29)	X	1.24 (0.90-1.73)	1.17 (0.83-1.65)
	Middle	1.22 (0.89-1.66)	X	1.06 (0.78-1.45)	1.05 (0.76-1.45)
	Low	1	X	1	
Decision latitude	Low	1.49 (1.06-2.10)	X	1.26 (0.88-1.81)	1.18 (0.82-1.72)
	Middle	0.94 (0.68-1.32)	X	0.93 (0.66-1.30)	0.92 (0.65-1.30)
	High	1	X	1	1
Social support	Low	1.41 (1.10-1.81)	X	1.06 (0.81-1.38)	0.99 (075-1.31)
	High	1	X	1	1
Physical demands	High	1.69 (1.30-2.19)	X	1.45 (1.11-1.91)	1.38 (1.04-1.82)
	Low	1	X	1	1
Emotional demands	High	2.20 (1.68-2.88)	X	1.89 (1.43-2.51)	1.95 (1.45-2.63)
	Low	1	X	1	1
Work-family conflict	Yes	2.19 (1.55-3.10)	X	1.80 (1.27-2.56)	1.47 (1.01-2.13)
	No	1	X	1	1

95%CI = 95% Confidence Interval;
Adj OR 1 = Odds Ratio adjusted for gender, age, educational level, living situation and coping style;
Adj OR 2 = Adj OR 1 + adjusted for the other health variables in the model;
Adj OR 3 = Adj OR 1 + adjusted for the other work variables in the model;
Adj OR 4 = All health and work variables, (socio)demographics and coping style entered in one block.

Table 3 shows the results regarding health problems and psychosocial work characteristics as predictors of visiting the OP instead of the GP in relation to work four to eight months later. In comparison to visitors of the GP only, mode-

rately stronger prospective associations were present between the health problems and visiting the OP only. Similar to prospective associations between psychosocial work characteristics and visiting only the GP, physical demands were found to be associated to visiting only the OP after adjustment for the other psychosocial work characteristics (model 3). Contrarily, no associations were found for emotional demands and presence of a work-family conflict after adjustment for the other work variables.

Table 3– Multiple logistic regression of indicators of health problems and psychosocial work characteristics as predictors of having visited or not having visited only the OP in relation to work four to eight months later with having visited nor the GP, neither the OP in relation to work as the reference group (Visitors of only the OP versus Non-visitors)

Variable		Adj OR1 (95% CI)	Adj OR2 (95% CI)	Adj OR3 (95% CI)	Adj OR4 (95% CI)
Health problems					
Probable fatigue case	Yes	2.43 (1.82-3.24)	1.75 (1.26-2.42)	X	1.61 (1.15-2.24)
	No	1	1	X	1
Probable mental health problem Case	Yes	2.44 (1.84-3.23)	1.82 (1.33-2.50)	X	1.62 (1.16-2.27)
	No	1	1	X	1
At least one chronic condition	Yes	2.14 (1.61-2.86)	1.82 (1.35-2.44)	X	1.80 (1.33-2.44)
	No	1	1	X	
Psychosocial work characteristics					
Psychological job demands	High	1.30 (0.94-1.80)	X	1.08 (0.77-1.52)	0.96 (0.68-1.36)
	Middle	0.78 (0.56-1.09)	X	0.72 (0.52-1.02)	0.69 (0.49-0.97)
	Low	1	X	1	
Decision latitude	Low	1.57 (1.08-2.28)	X	1.33 (0.90-1.97)	1.22 (0.82-1.81)
	Middle	1.00 (0.71-1.42)	X	0.98 (0.69-1.40)	0.96 (0.67-1.38)
	High	1	X	1	1
Social support	Low	1.48 (1.13-1.95)	X	1.23 (0.92-1.64)	1.17 (0.87-1.58)
	High	1	X	1	1
Physical demands	High	1.60 (1.20-2.11)	X	1.45 (1.09-1.94)	1.36 (1.01-1.83)
	Low	1	X	1	1
Emotional demands	High	1.48 (1.12-1.95)	X	1.28 (0.95-1.71)	1.07 (0.79-1.44)
	Low	1	X	1	1
Work-family conflict	Yes	1.68 (1.11-2.56)	X	1.46 (0.95-2.23)	1.14 (0.73-1.78)
	No	1	X	1	1

95%CI = 95% Confidence Interval;
Adj OR 1 = Odds Ratio adjusted for gender, age, educational level, living situation and coping style;
Adj OR 2 = Adj OR 1 + adjusted for the other health variables in the model;
Adj OR 3 = Adj OR 1 + adjusted for the other work variables in the model;
Adj OR 4 = All health and work variables, (socio)demograhics and coping style entered in one block.

Additionally, we checked whether having visiting the GP or OP in relation to work during the past four months at the baseline measurement of our study (questionnaire of May 2000) had an influence on our results. Separating incident from prevalent visitors by means of stratification for visitors of only the GP or OP versus non-visitors at baseline, had no major effect on the health problems and psychosocial work characteristics as predictors of consulting one of the two physicians, except for one association. In the additional stratified analyses, we did not find a prospective association anymore between presence of at least one chronic condition and visiting only the GP or only the OP (specific data not shown).

DISCUSSION

The results of our prospective study among employees active at work show that indicators of health problems, physical and emotional demands at work, and presence of a work-family conflict were independently associated with visiting a physician in relation to work. In contrast, psychological job demands, decision latitude, and social support at work were not found to be independently prospectively associated to visiting a physician in relation to work. To our knowledge, this was the first longitudinal study in which both health-related and work-related variables were simultaneously examined as predictors of help-seeking behaviour in a working population, while also taking into account the effects of sociodemographic characteristics of employees and employees' coping styles on consulting a physician.

Our finding that indicators of health problems are prospectively associated to consulting a physician in relation to work, are in line with studies suggesting associations between indicators of health problems and help-seeking behaviour in the general population.[4-16] Regarding the nature of health problems measured in our study, for both prevalent and incident visitors being a probable mental health problem case was prospectively associated with visiting only the OP, and also – but to a lesser extent – with visiting only the GP in relation to work,. The same picture emerged for employees who were designated as probable fatigue cases, although the association between fatigue and consulting the GP was not significant anymore in the fully adjusted regression model. With respect to the presence of at least one chronic condition, it should be noted that associations with visiting either the GP or OP in relation to work were only found for prevalent visitors, and not for incident visitors. This finding might be related to the exclusion of employees not at work in our study population.

Regarding the psychosocial work characteristics, significant independent prospective associations with consulting a physician after adjustment for health problems, sociodemographics and coping style were found for emotional and physical demands at work and presence of a work-family conflict, but not for psychological job demands, decision latitude and social support. Possibly, these latter three variables are rather indirectly – via health-related variables – than directly associated to consulting a physician in relation to work. Furthermore, it is also interesting to notice that emotional demands at work and the presence of a work-family conflict not only were independently related to consulting a physician in relation to work, but also showed a differential effect regarding whether the GP or the OP was visited, in favour of the GP. In contrast, this differential effect was not found regarding physical demands at work. This finding might indicate that employees experiencing problems that are presumably more difficult to objectify for both patients and physicians (viz. emotional demands at work, the presence of a work-family conflict) than problems within the field of physical demands (viz. musculoskeletal demands at work), prefer to visit the GP in relation to work.

In light of possible limitations of our study, several issues have to be mentioned. As help-seeking behaviour is known to be a complex process,[4,9,57] consulting a physician in relation to work can be expected to be influenced by more factors than the presence of health and work problems alone. In light of this, we decided to present the results of the multivariate analyses after adjustment for sociodemographics and coping styles, representing factors that were found or likely to have a relation with help-seeking behaviour.[4,6,17-19] Furthermore, since other longitudinal studies focusing on prospective relations between health problems, psychosocial work characteristics and help-seeking behaviour of the working population are as yet not available, it is difficult to evaluate whether our time span of four to eight months between the health and work variables as predictors and consulting a physician, is an appropriate one. Another issue is that both our independent and dependent variables were measured by means of self-report variables. Using self-report measurements instead of more objective measurements may be expected to have a stronger influence on the interpretation of the predicting variables than on the interpretation of the outcome variable, since our outcome variable refers to a concrete action undertaken by the employee, i.e. visiting the GP or OP in relation to work. Regarding the outcome variable, however, it should be noted that we had to follow the opinion of the employee whether the visit to the GP or OP took place in relation to work or not. In the light of strengthening the grip of both patients (ie, employees) and physicians on help-seeking behaviour in relation to work, it would be interesting to study how employees prefer to attribute such a visit (to work-related variables, to health-related variables, or to a combination of both?), and to compare these attributions

to the results of our study. Regarding the health-related and work-related variables measured in our study, it should be noted that we had to rely on perceived instead of presented morbidity, as information about this latter type of morbidity was not gathered within this large-scale epidemiological study. Furthermore, we cannot determine whether employees underreported or exaggerated problems regarding their health or psychosocial work characteristics, since we had no external criterion available (e.g. a doctor's diagnosis) to check whether indicators of health problems or psychosocial work characteristics of employees were documented as relevant problems. However, finding an objective measurement is difficult for most of the health problems and psychosocial work characteristics we used as predictors. Moreover, the finding that employees' own perceptions of indicators of health problems and psychosocial work characteristics are associated with seeking help in relation to work while still active at work (thus not absent in relation to sickness absence), is an interesting finding on its own for both GPs and OPs. When confronted with a patient visiting in relation to work but nevertheless still active at work, gathering information about possibly present health problems can be a first important step in identifying and taking care of support for or the treatment of underlying problems that may be a threat to the work ability of the employee. Regarding our study population, we wanted to focus on employees consulting the physician on their own initiative. Although information about whose initiative it was to visit the GP or OP in relation to work was not available, we still felt it was possible to select employees likely to be actively involved in the decision to consult a doctor in relation to work. By excluding employees at sick leave at baseline and by also excluding employees visiting both GP and OP in relation to work, we were able to diminish the influence of consulting a physician with a more compulsory character (i.e. in relation to sickness absence). Furthermore, by excluding employees visiting both GP and OP in relation with work, we were also likely to have diminished the influence of a referral via the OP to the GP, or a referral via the GP to the OP. Consequently, our study population is likely to exist of employees undertaking a concrete and self-initiated help-seeking action, involving rather employees' own initiative than the initiative of their employers or physicians.

In conclusion, our study is the first to provide results indicating that both health problems and psychosocial work characteristics of employees are prospectively associated to consulting a physician in relation to work, and that interrelationships between health and work variables are also likely to affect this help-seeking behaviour. Not only studying these associations between health and work variables on a cross-sectional level but also in a longitudinal perspective in relation to subsequent help-seeking behaviour, may further help to give both employed patients and physicians more insight in factors influencing the help-seeking process in the working population. As GPs and OPs both have a role in guarding the work ability of their employed patients,[58-60] further unraveling longitudinal relationships

between health problems, psychosocial work characteristics and help-seeking behaviour of the working population can be helpful in optimizing care for this group of employed patients.

ACKNOWLEDGEMENTS

As a part of the Maastricht Cohort Study on Fatigue at Work, this study participates in the Netherlands concerted research action on "Fatigue at Work" and receives a grant from the Netherlands Organisation for Scientific Research (NWO grant no. 580-02.255, part I).

REFERENCES

1. Philipsen H, Het verloop van een ziektegeval en de aanvaarding van de rol van patient. In: Afwezigheid wegens ziekte, p. 16-31. Groningen, 1969.
2. Aakster CW, Groothoff JW, eds. Medische sociologie: sociologische perspectieven op ziekte en zorg (vijfde ed.) (Medical Sociology; fifth ed.). Groningen: Wolters-Noordhoff, 1998.
3. Armstrong D. Outline of sociology as applied to medicine (4th ed.). Oxford: Butterworth-Heinemann; 1994.
4. Al-Windi A, Dag E, Kurt S. The influence of perceived well-being and reported symptoms on health care utilization: A population-based study. J Clin Epidemiol 2002;55:60-66.
5. Corney RH. Sex differences in general practice attendance and help seeking for minor illness. J Psychosom Res 1990;34:525-34.
6. Kolk AMM, Hanewald GJFP, Schagen S, Gijsbers van Wijk CMT. Predicting medically unexplained physical symptoms and health care utilization; a symptom-perception approach. J Pyschosom Res 2002;52:35-44.
7. Krasnik A, Hansen E, Keiding N, Sawitz A. Determinants of general practice utilization in Denmark. Dan Med Bull 1997;44:542-6.
8. Verhaak PF. Determinants of the help-seeking process: Goldberg and Huxley's first level and first filter. Psychol Med 1995;25:95-104.
9. Campbell SM, Roland MO. Why do people consult the doctor? Fam Pract 1996;13:75-83.
10. Ren A, Okubo T, Takahashi K. Health status, health habits, utilization behaviour and health care utilization in an actively employed Japanese population. Occup Med 1995;45:186-92.
11. Ren A, Okubo T, Takahashi K. Health-related worries, perceived health status, and health care utilization. J UOEH 1994;16:287-99.
12. Van de Kar A, Knottnerus A, Meertens R, Dubois V, Kok G. Why do patients consult the general practitioner? Determinants of their decision. Br J Gen Pract 1992;42:313-6.
13. Banks MH, Beresford SA, Morrell DC, Waller JJ, Watkins CJ. Factors influencing demand for primary medical care in women aged 20-44 years: a preliminary report. Int J Epidemiol 1975;4:189-95.

14. Williams P, Tarnopolsky A, Hand D, Shepherd M. Minor psychiatric morbidity and general practice consultation: the West London Survey. Pyschol Med 1986:91-37.
15. Barsky AJ, Wyshak G, Klerman G. Medical and psychiatric determinants of outpatient medical utilization. Med Care 1986;6:548-60.
16. McFarland BH, Freeborn DK, Mullooly JP, Pope CR. Utilization patterns among long-term enrollees in prepaid group practice Health Maintenance Organization. Med Care 1985;23:1221-33.
17. Carlisle R, Johnstone S. The relationship between census-derived socio-economic variables and general practice consultation rates in three town centre practices. Br J Gen Pract 1998;48:1675-8.
18. Carr Hill RA, Rice N, Roland M. Socioeconomic determinants of rates of consultation in general practice based on fourth national morbidity survey of general practices. BMJ 1996;312:1008-12.
19. Mechanic D. Health and illness behavior and patient-practitioner relationships. Soc Sci Med 1992;34:1345-50.
20. Sims A. The scar that is more than skin deep: the stigma of depression. Br J Gen Pract 1993;43:30-1.
21. Williams SJ, Calman M. Key determinants of consumer satisfaction with general practice. Fam Pract 1991;8:237-42.
22. Tiesinga LJ, Dassen TWN, Halfens RJH. Fatigue: A summary of the definitions, dimensions, and indicators. Nurs Diagn 1996;7:51-62.
23. Kirk J, Douglass R, Nelson E, et al. Chief complaint of fatigue: a prospective study. J Fam Pract 1990;30:33-41.
24. Kroenke K, Wood DR, Mangelsdorff D, Meier NJ, Powell JB. Chronic Fatigue in Primary Care: Prevalence, Patient Characteristics, and Outcome. JAMA 1988;260:929-34.
25. Ridsdale L, Evans A, Jerrett W, et al. Patients with fatigue in general practice: a prospective study. BMJ 1993;307:103-6.
26. Meijman TF, Over vermoeidheid: arbeidspsychologische studies naar beleving van belastingeffecten [Fatigue: studies on the perception of workload effects]. Amsterdam: University of Amsterdam, 1991.
27. Muntaner C, Schoenbach C. Psychosocial work environment and health in U.S. metropolitan areas: a test of the demand-control and demand-control-support models. Intern J Health Serv 1994;24:337-53.
28. Stansfeld SA, Fuhrer R, Head J, Ferrie J, Shipley M. Work and psychiatric disorder in the Whitehall II study. J Psychosom Res 1997;43:73-81.
29. Stansfeld SA, Fuhrer R, Shipley M, Marmot MG. Work characteristics predict psychiatric disorder: prospective results from the Whitehall II study. Occup Environ Med 1999;56:302-7.
30. Bültmann U, Kant IJ, van den Brandt PA, Kasl SV. Psychosocial work characteristics as risk factors for the onset of fatigue and psychological distress: Prospective results from the Maastricht Cohort Study. Psychol Med 2001;32:333-45.
31. Andrea H, Beurskens AJHM, van Amelsvoort LGPM, et al. Health problems and psychosocial work environment as predictors of long-term sickness absence. Occup Environ Med 2002;60:295-300.

32. Voss M, Floderus B, Diderichsen F. Physical, psychosocial, and organisational factors relative to sickness absence: a study based on Sweden Post. Occup Environ Med 2001;58:178-84.
33. Smulders PGW, Nijhuis FJN. The Job Demands-job control model and absence behaviour: results of a 3-year longitudinal study. Work Stress 1999;13:115-31.
34. Niedhammer I, Bugel I, Goldberg M, Leclerc A, Guéguen A. Psychosocial factors at work and sickness absence in the Gazel cohort: a prospective study. Occup Environ Med 1998;55:735-41.
35. North FM, Syme SL, Feeney A, Shipley M, Marmot M. Psychosocial work environment and sickness absence among British civil servants: the Whitehall II study. Am J Public Health 1996;86:332-40.
36. Frone MR, Russell M, Cooper ML. Antecendents and outcomes of work-family conflict: Testing a model of the work-family interface. J Appl Psychol 1992;77:65-78.
37. Allen TD, Herst DEL, Bruck CS, Sutton M. Consequences associated with work-to-family conflict: A review and agenda for future research. J Occup Health Psychol 2000;5:278-308.
38. Jansen NWH, Kant IJ, Kristensen TS, Nijhuis FJN. Antecedents and consequences of work-family conflict:: a prspoective study. J Occup Environ Med 2003;45:479-91.
39. Kant IJ, Beurskens AJHM, Schroer CAP, et al. De Maastrichtse Cohort Studie naar langdurige psychische vermoeidheid in de arbeidssituatie (The Maastricht Cohort Study of prolonged Fatigue at Work). Tijdschrijft voor bedrijfs- en verzekeringsgeneeskunde 2000;8:226-32.
40. Bültmann U, Kant IJ, Kasl SV, Beurskens AJHM, van den Brandt PA. Fatigue and psychological distress in the working population: psychometrics, prevalence and correlates. J Psychosom Res 2002;52:445-52.
41. Kant IJ, Bültmann U, Schroer CAP, et al. An epidemiological approach to study fatigue in the working population: The Maastricht Cohort Study. Occup Environ Med 2003;60:i32-9.
42. Bültmann U, De Vries M, Beurskens AJHM, et al. Measurement of prolonged fatigue in the working population: determination of a cut-off point for the Checklist Individual Strength. J Occup Health Psychol 2000;5:411-6.
43. Beurskens AJHM, Bültmann U, Kant IJ, et al. Fatigue among working people: validity of a questionnaire measure. Occup Environ Med 2000;57:353-7.
44. Vercoulen JH, Swanink CM, Fennis JF, et al. Dimensional assessment of chronic fatigue syndrome. J Psychosom Res 1994;38:383-92.
45. Franssen PML, Bültmann U, Kant IJ, van Amelsvoort LGPM. The association between chronic diseases and fatigue in the working population. J Psychosom Res 2003;54:339-44
46. Koeter MWJ, Ormel J, Handleiding General Health Questionnaire; Nederlandse bewerking (GHQ, Manual Dutch Version). Lisse: Swets & Zeitlinger, 1991.
47. Goldberg DP, Williams P, A user's guide to the General Health Questionnaire. Windsor: NFER-Nelson, 1988.
48. Hardy GE, Shapiro DA, Borrill CS. Fatigue in the workforce of national health service trusts: levels of symptomatology and links with minor psychiatric disorder, demographic, occupational and work role factors. J Psychosom Res 1997;43:83-92.

49. Wall TD, Bolden RI, Borrill CS, et al. Minor psychiatric disorder in NHS trust staff: occupational and gender differences. Br J Psychiatry 1997;171:519-23.
50. Houtman I. Reliability and validity of the Dutch version of the Karasek Job Content Questionnaire.APA/NIOSH conference on Work, Stress and Health. Washington (DC): APA, 1995.
51. Karasek RA, Job content questionnaire and users's guide. Los Angeles (CA): University of South California: Department of Industrial and Systems Engineering, 1985.
52. Grundemann RWM, Smulders P, Winter Cd, Handleiding vragenlijst Arbeid en Gezondheid (Questionnaire on Work and Health. Manual). Lisse: Swets & Zeitlinger, 1993.
53. Hildebrandt VH, Bongers PM, Dijk FJv, Kemper HC, Dul J. Dutch Musculoskeletal Questionnaire: description and basic qualities. Ergonomics 2001;44:1038-55.
54. Veldhoven M, Meijman T, Het meten van psychosociale arbeidsbelasting met een vragenlijst. De vragenlijst beleving en beoordeing van de arbeid (VBBA) (Questionnaire on Perception and Judgement of Work). Amsterdam: NIA, 1994.
55. Schreurs PJG, Willige Gvd, Omgaan met problemen en gebeurtenissen. De Utrechtse Copinglijst (UCL). Lisse: Swets & Zeitlinger, 1988.
56. SPSS Inc, SPSS Base 10.0 for Windows User's Guide. Chicago (IL): SPSS Inc., 1999.
57. Gomez Rodriguez E, Moreno Raymundo P, Hernandez Monsalve M, Gervas J. Socio-economic status, chronic morbidity and health services utilization by families. Fam Pract 1996;13:382-5.
58. Van Dijk FJH, Prins R. Occupational health care and work incapacity: recent developments in the Netherlands. Occup Environ Med 1995;45:159-66.
59. Buijs P, van Amstel R, van Dijk F. Dutch occupational physicians and general practitioners wish to improve cooperation. Occup Environ Med 1999;56:709-13.
60. Buijs PC, van Amstel RJ, van Dijk FJ, Guidance of sickness absence: cooperation of Dutch occupational physician and general practitioner. 1999.

Health problems and psychosocial work environment as predictors of long term sickness absence in employees who visited the occupational physician and/or general practitioner in relation to work: a prospective study

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Occupational and Environmental Medicine 2003;60:295-300

ABSTRACT

Objectives
To determine whether psychosocial work environment and indicators of health problems are prospectively related to incident long term sickness absence in employees who visited the Occupational Physician (OP) and/or General Practitioner (GP) in relation to work.

Methods
The baseline measurement (May 1998) of the Maastricht Cohort Study, a prospective cohort study among 45 companies and organisations, was used to select employees at work who indicated having visited the OP and/or GP in relation to work. Self report questionnaires were used to measure indicators of health problems (presence of at least one long term disease, likelihood of having a mental illness, fatigue) and psychosocial work environment (job demands, decision latitude, social support, job satisfaction) as predictors of subsequent sickness absence. Sickness absence data regarding total numbers of sickness absence days were obtained from the companies and occupational health services during an 18 month period (between 1 July 1998 and 31 December 1999). Complete data were available from 1271 employees.

Results
After adjustment for demographics and the other predictors, presence of at least one long term disease (OR 2.36; 95% Confidence Interval 1.29 to 4.29) and lower level of decision latitude (OR: 1.69; 95% CI 1.22 to 2.38) were the strongest predictors for sickness absence of at least one month. A higher likelihood of having a mental illness, a higher level of fatigue, a lower level of social support at work and low job satisfaction were also significant predictors for long term sickness absence, but their effect was less strong.

Conclusions
In detecting employees at work but at risk for long term sickness absence, OPs and GPs should take into account not only influence of the psychosocial work environment in general and level of decision latitude in particular, but also the influence of indicators of health problems, especially in the form of long term diseases.

INTRODUCTION

Long term sickness absence is an economic as well as a medical problem. In the Netherlands, the average absence rate was for example 8.3% in 1993, with an estimated cost of 3,9 billion euro for the provision of sickness absence benefits alone.[1] Long term sickness absence has a substantial impact on costs as a result of loss of productivity for the employer. For the employee, it can lead to reduced income or dismissal on grounds of work disability[2] and to social isolation, which could lessen the chances of return to work.

Both health problems and work characteristics are reported as predictors of sickness absence.[3-7] Health problems were found to predict long spells of absence.[3-4] Health problems were also associated with employees' negative perception of their psychosocial work environment[8-9] and may therefore mediate relations between employees' perceptions of their psychosocial work environment and sickness absence.[10] The work environment could also be linked more directly to sickness absence.[5]

In the Netherlands, both the Occupational Physician (OP) and General Practitioner (GP) are often confronted with employees absent because of sickness absence. As a result of their position in Dutch health care, OPs and GPs could play an important role in the prevention of sickness absence. GPs fulfil a function as a gatekeeper for both the working and general population, although, unlike their colleagues abroad, they do not certify sickness absence of their own patients. From 1998 on, all Dutch companies have had OPs employed. The tasks of the OP are not only counselling of the employee regarding sickness absence, but also to endorse measures to prevent sickness absence.[11] As OPs have a good insight in the work environment of employees visiting in relation to work, they can help to shorten sickness absence or to prevent it. OPs advise sick employees and their employers about resuming work and they organise occupational rehabilitation. When they are consulted by employees who are still at work (thus not at sick leave) but experience problems in their work situation, OPs are in good position to guard the ability of employees to work, by advising both employee and employer how to adjust working conditions of the employee (for example, temporarily reduction of number of working hours or a change of job content).

Studying indicators of health problems and psychosocial work environment in employees who visited the OP and/or GP in relation to work may provide the OP and GP with a way to detect patients at risk of long term sickness absence and to identify possible measures to prevent sickness absence in those patients. This group of patients is easily accessible for the OP or the GP, as this group consists

of employees who indicated having visited the GP, OP or both of them. However, previous studies regarding predictors of incident long term sickness absence did not focus specifically on this group of employees . The main objective of this study was to determine whether indicators of health problems and psychosocial work environment are prospectively related to company-registered long term sickness absence in a working population that visited the OP and/or GP in relation to work. An additional objective was to study whether relations between these predictors and sickness absence were different for employees at work who reported having visited the OP in relation to work and for those reporting having visited the GP in relation to work.

METHOD

Study population

The study population was selected from the Maastricht Cohort Study, a large prospective epidemiological study about fatigue at work in a working population which has been underway in the Netherlands since May 1998. Self report questionnaires were used to collect data on a broad range of work related and non-work related data possibly associated with fatigue among employees from 45 companies and organisations from different sectors, with almost 700 different occupations.[12] More detailed information about design, procedure and baseline characteristics of the Maastricht Cohort Study are described elsewhere.[13-14] In this study, we wanted to focus on risk factors for sickness absence in a population which was active at work but reported having visited the GP and/or OP in relation to work, as an indicator of experiencing problems in relation to work. From the 12,140 employees who completed and returned the baseline questionnaire (May 1998), we therefore excluded those employees not working at that moment (n=299) or whose sickness absence started before the beginning of our measurement of sickness absence (n=481). Of this remaining working population, 11,229 employees (98.8%) answered the question 'Did you visit the OP in relation with your work during the last four months?' and the same question for the GP. In total, 9506 employees (84.7%) visited neither GP nor OP; 377 employees (3.4%) visited only the OP; 694 employees (6.2%) visited only the GP, and 652 employees (5.7%) visited both the OP and GP. We selected only those employees who reported having visited the OP and/or GP in relation to work (n=1723), as we wanted to study predictors of sickness absence in employees who indicated having visited the OP and/or GP in relation to work at the moment those employees were still at work. When compared to those having visited neither GP nor OP, a higher percentage of these employees (30.6% versus 17.1%) reported a low educational level (primary school or lower vocational education), and a higher

percentage of these employees (43.8% versus 18.6%) reported the presence of a disease.

Measurements

Sickness absence data regarding total number of sickness absence days between 1 July 1998 and 31 December 31 1999 were used, in order to compare employees with sickness absence of a longer duration to employees with no sickness absence/sickness absence of a short duration. Company offices and occupational health services of the employees involved provided the sickness absence records, for which all cohort participants had given informed consent. Complete sickness absence data were available for 1271 employees, as not all companies and occupational health services were able to deliver complete sickness absence data over the whole 1.5 year period in which the sickness absence records were obtained. To be able to study long term sickness absence, we categorised the sickness absence data in five groups, in which the first category served as the reference group: No/short sickness absence (no sickness absence/sickness absence with a total duration of 1-7 days); Sickness absence of 8-29 days; Sickness absence of 1-3 months (30-89 days); Sickness absence of 3-6 months (90-179 days), and sickness absence of at least 6 months (180 days and more). Since sickness absence of up to seven days in one year is usually considered as sickness absence of a short duration in the Netherlands, our reference group included employees with a maximum of seven absence days in 1.5 year.

To measure the presence of at least one long term disease, employees ticked off whether they had one or more of an extensive list of long term conditions. A Dutch translation of the 12 item version General Health Questionnaire (range 12-48, using the Likert score), developed as a screening instrument for detecting minor psychiatric disorders in the general population,[15-16] was used to measure likelihood of having a mental illness. The 20 item Checklist Individual Strength (range 20-140), a multidimensional questionnaire covering aspects of prolonged fatigue during the past two weeks[17-19] was also included as an indicator of health problems at baseline.

Measurement of psychosocial work environment at baseline consisted of job satisfaction, by means of a single question and of psychosocial work-related factors, by means of three subscales of a Dutch version of the Job Content Questionnaire (JCQ).[20-21] The subscale job demands (5 items; range 12-48) relates to demands of the job, time pressure and conflicting demands. The subscale decision latitude (9 items; range 24-96) assesses the level of skill and creativity required on the job and flexibility the worker is permitted in deciding what skills to

employ, and also the organizationally mediated possibilities for workers to make decisions about their work. Social support (8 items; range 8-32) focuses on supervisors' concern for the welfare of subordinates and co-workers' competence and helpfulness. Job strain, which refers to the combination of high scores on job demands and low scores on decision latitude, has been associated with adverse health effects.[20] The employees also provided information about demographics gender, age and level of education (recoded as low, medium or high).

Statistical analyses

All data analyses were performed using SPSS version 10.0 for Windows.[22] Employees with incomplete data were excluded from the analyses. Two-tailed t-tests (for continuous variables) and chi-square tests (for dichotomous/categorical variables) were used to test univariate differences between employees in the reference group (no/short sickness absence) and the other sickness absence groups. The health and work variables (indicators of health problems at baseline and psychosocial work environment at baseline respectively) were included in a multiple logistic regression analysis. Multiple regression analyses were only conducted for comparisons between the reference group and sickness absence groups with at least one significant difference on a univariate level regarding the health and work variables. Interaction terms between having visited the OP and/or GP (only the OP, only the GP, or both) and the health and work variables were added to the model to check whether predictors for sickness absence were different for employees having visited only the OP, having visited only the GP, or having visited both. To prevent occurrence of multicollinearity, correlations between all variables were checked beforehand and no high collinearity was found. Furthermore, the continuous predictors were categorised in four groups to check whether a linear relationship was appropriate. To ease interpretation from the regression analyses, total scores of continuous variables were standardised by dividing them by their own standard deviation. Demographics were included as control variables.

RESULTS

Table 1 shows basic characteristics for the study population. We checked at univariate and multivariate levels whether demographic variables, health problems and psychosocial work characteristics as predictors of sickness absence were different for employees who visited the OP in relation to work compared to visitors of the GP and visitors of both OP and GP. As we found similar results in all three groups, results are not presented for OP and GP visitors separately.

Table 1 – Descriptive baseline characteristics of group no/short sickness absence (employees with no sickness absence/absence of 1-7 days), sickness absence of 8-29 days, sickness absence of 1-3 months (30-89 days), sickness absence of 3-6 months ()90-179 days), and sickness absence of at least 6 months (180 days and more) for employees who indicated having visited the OP and/or GP in relation to work during the past 4 months at baseline (total n=1271)

	No/short sickness absence (n=488)	Sickness absence			
		8-29 days (n=326)	1-3 months (n=250)	3-6 months (n=131)	≥ 6 months (n=76)
Variable	Frequency / Mean (sd)				
Demographic					
Gender (% male)	76.8%	78.5%	68.4%*	74.8%	64.9%*
Age (in years)	41.0 (9.6)	40.2 (9.0)	40.4 (0.3)	40.4 (9.9)	42.1 (10.1)
Highest level of education					
- Low	28.2%	29.5%	33.8%	36.0%	33.8%
- Medium	46.1%	51.4%	55.0%	52.8%	47.9%
- High	25.6%	19.0%	11.3%***	11.2%**	18.3%
Indicators of health problems					
At least one long term disease (% yes)	36.5%	37.1%	47.6%**	55.0%***	61.8%***
Likelihood of mental illness; GHQ-Likert total score	26.3(6.7)	26.0(6.4)	26.8(6.9)	26.2 (5.9)	28.9 (7.4) **
Fatigue; CIS total score	68.5 (24.2)	69.7 (24.4)	69.2(24.2)	70.5(23.9)	82.2 (24.0) ***
Psychosocial work environment (JCQ total score per scale)					
Job demands	34.6(6.2)	34.6(5.8)	35.1 (6.0)	35.2 (6.3)	35.9 (6.5)
Decision latitude	69.8 (12.6)	66.7 (12.3) ***	65.6 (13.2) ***	64.5 (12.4) ***	62.7 (11.7) ***
Social support	21.8 (3.6)	21.4 (3.4)	21.2 (3.5) *	20.9 (3.9) *	20.7 (3.7) **
Low job satisfaction (% yes)	17.0%	20.2%	25.5%**	27.9%**	32.0%**

GHQ = 12-item General Health Questionnaire; CIS = Checklist Individual Strength; JCQ = Job Content Questionnaire. *t* test/Chi-square test:: *p<0.05 difference compared to score in group no/short sickness absence **p<0.01 difference compared to score in group no/short sickness sickness absence; ***p<0.001 difference compared to score in group no/short sickness sickness absence.

At univariate level, a clear trend was observed especially for the relation between presence of at least one long term disease and a lower level of decision latitude as predictors for sickness absence of at least one month. To a lesser extent, this trend was also observed for the other health and work variables, except for level of job demands. Regarding number of reported long term diseases, we additionally checked whether a relation was present between reporting one, two, or at least three long term diseases and sickness absence. A very moderate positive association was present between number of long term diseases and length of sickness absence (Spearman's Rho correlation coefficient, r=0.17, p<0.001). The strongest association with respect to the demographic variables was present between a lower educational level and an increasing sickness absence length.

Table 2 presents three multivariate logistic models comparing the reference group with the groups with sickness absence of one to three months, of three to six months and of at least six months respectively. Three Odds Ratios are presented for the indicators of health problems and psychosocial work environment: crude Odds Ratios, Odds Ratios adjusted for demographics and Odds Ratios adjusted for all predictors in the model. Presence of at least one long term disease was the strongest predictor of sickness absence of at least one month. A significant association between level of fatigue and sickness absence of at least six months was found in the model adjusted for demographics, but this association decreased and was no longer significant when adjusted for the other predictors. Scores on the mental illness measure showed no significant association with sickness absence of at least six months anymore, after adjustment for confounding by demographics. With respect to psychosocial work environment, a lower level of decision latitude was the strongest predictor of sickness absence of at least one month. When adjusted for demographics, a higher percentage of employees reporting a low level of job satisfaction was only predictive in the groups with sickness absence of at least three months. Lower level of social support predicted sickness absence of three to six months only moderately. For job satisfaction and social support, the associations disappeared and were no longer significant when adjusted for the other health and work variables. No interactions were found between level of job demands, decision latitude, social support and subsequent sickness absence. For both indicators of health problems and psychosocial work environment, additional analyses were performed to check whether the reported results were different when also looking at the frequency of sickness absence. These analyses did not reveal considerable differences in the results.

DISCUSSION

We found that in a population of working employees who indicated having visited the OP and/or GP in relation to work in the period of four months before baseline, the presence of at least one long term disease and a lower level of decision latitude at work predicted sickness absence of at least one month. To our knowledge, this is the first prospective cohort study examining indicators of health problems and psychosocial work environment related to long term sickness absence in a population consisting of employees at work and having visited the OP and/or GP in relation to work. Our identification of presence of at least one long term disease and level of decision latitude at work as the most relevant predictors of long term sickness absence corresponds with results of the Whitehall II Study

Table 2 – Logistic regression of indicators of health problems and psychosocial work environment on no/short sickness absence (0-7 days; n=488) versus sickness absence of 1-3 months (30-89 days; n=250), 3-6 months (90-179 days; n=131), and at least 6 months (180 days and more; n=76) for employees who indicated having visited the GP and/or OP in relation to work during the past 4 months at baseline

	No/short sickness absence versus sickness absence of 1-3 months			No/short sickness absence versus sickness absence of 3-6 months			No/short sickness absence versus sickness absence of at least 6 months		
VARIABLE	Crude OR (95%CI)	Adj OR 1 (95%CI)	Adj OR 2 (95%CI)	Crude OR (95%CI)	Adj OR 1 (95%CI)	Adj OR 2 (95%CI)	Crude OR (95%CI)	Adj OR 1 (95%CI)	Adj OR 2 (95%CI)
Indicators of health problems									
- Presence at least one long-term disease	1.66**	1.48*	1.62**	2.35***	2.23***	2.49***	2.77***	2.38**	2.36**
	(1.18-2.32)	(1.04-2.10)	(1.13-2.34)	(1.53-3.61)	(1.43-3.47)	(1.57-3.96)	(1.61-4.77)	(1.36-4.17)	(1.29-4.29)
- Likeliness of mental illness (GHQ-Likert total score per sd increase)	1.02	1.01	1.00	1.01	1.00	0.97	1.05**	1.04	0.98
	(0.99-1.04)	(0.98-1.04)	(0.96-1.03)	(0.98-1.04)	(0.97-1.03)	(0.93-1.02)	(1.01-1.09)	(1.00-1.08)	(0.93-1.04)
- Fatigue (CIS total score per sd increase)	1.06	1.04	0.86	1.15	1.15	0.97	1.79***	1.75***	1.48
	(0.91-1.26)	(0.87-1.24)	(0.69-1.08)	(0.93-1.41)	(0.92-1.43)	(0.71-1.32)	(1.37-2.35)	(1.31-2.33)	(0.99-2.21)
Psychosocial work environment									
- JCQ total-score per subscale									
Job demands (per sd increase)	1.08	1.06	0.97	1.01	1.09	1.02	1.25	1.19	1.19
	(0.92-1.28)	(0.90-1.26)	(0.81-1.17)	(0.90-1.35)	(0.89-1.35)	(0.81-1.28)	(0.96-1.62)	(0.91-1.55)	(0.90-1.56)
Decision latitude (per sd increase)	0.69***	0.76**	0.78*	0.64***	0.67***	0.72*	0.58***	0.57***	0.59**
	(0.59-0.81)	(0.64-0.90)	(0.64-0.96)	(0.52-0.79)	(0.54-0.83)	(0.56-0.93)	(0.45-0.74)	(0.42-0.75)	(0.42-0.82)
Social support (per sd increase)	0.82*	0.85	0.90	0.78*	0.80*	0.92	0.74*	0.79	1.06
	(0.70-0.97)	(0.71-1.00)	(0.74-1.11)	(0.63-0.95)	(0.65-0.99)	(0.72-1.18)	(0.57-0.97)	(0.61-1.04)	(0.77-1.46)
- Job satisfaction	0.59**	0.60*	0.73	0.51**	0.49**	0.59	0.39**	0.45**	0.77
	(0.40-0.86)	(0.40-0.90)	(0.44-1.20)	(0.32-0.81)	(0.30-0.79)	(0.32-1.08)	(0.23-0.69)	(0.25-0.81)	(0.37-1.61)

Adj OR 1 = Odds Ratio adjusted for demographics (gender, age, and highest level of education); Adj OR 2 = Adj OR 1 + adjusted for indicators for health problems and psychosocial work environment; CIS = Checklist Individual Strength; GQH = 12 item General Health Questionnaire; JCQ = Job Content Questionnaire.

*p<0.05 difference compared to score in group no/short sickness absence; **p<0.01 difference compared to score in group no/short sickness absence; ***p<0.001 difference compared to score in group

(a large prospective cohort study of more than 10,000 civil servants with sickness absence as one of the outcomes). Although it should be noted that long term sickness absence was defined as absences of more than seven calendar days[3] and spells with a length of more than 21 days[4] in the Whitehall II Study, results of that study also indicated that the longer the duration of sickness absence, the more strongly did presence of longstanding illness predict rates of absence. Furthermore, jobs with elements of a low level of decision latitude indicated higher rates for long spells of sickness absence.[3-5] Other studies also identified level of decision latitude as an important predictor.[6,23] Also in line with our results, other work-related psychosocial factors were found to be less important; social support was only a relevant predictor in male employees,[6] and job satisfaction was not significant anymore after adjustment for self reported health.[4] Significant longitudinal associations between job strain (the combination of high scores on job demands and low scores on decision latitude) and long spells of sickness absence (at least seven days) were also not found.[5,6] Two other studies found contrasting results: having a job with high job strain was associated with a higher sickness absence rate,[24] and the greatest risk of sickness absence was present in employees with a combination of poor levels and negative changes in job control, job demands and social support.[25] However, the first study was cross-sectional in nature and the second study specifically focused on the change in psychosocial work environment during and after a period of economic decline. Also In contrast to our study, a higher likelihood of having a mental illness (GHQ-30 total score) predicted long spells of sickness absence in the Whitehall II Study.[3-4] Our use of the GHQ-12 and adjustment for a broader range of demographic variables, may have contributed to this difference. We have not identified any studies reporting on the relation between fatigue and long term sickness absence. Furthermore, also in line with our results was the finding that measures of health were more strongly associated with rates of longer spells than shorter spells.[4] From the demographic variables included as control variables in our study, educational level turned out to be a confounder. Taking into consideration that educational level is often viewed as a proxy for measuring SES, this finding is in line with the results of studies indicating that SES is an important factor to take into account in relation with health variables and psychosocial work characteristics[26] and subsequent sickness absence.[3-5]

The considerable amount of missing sickness absence data is a point of attention in our study. Not all companies and occupational health services were able to deliver complete sickness absence data for all employees involved in the study. However, as no relation was found between the predictors and the response (availability of sickness absence data in visitors of the OP and/or GP), we expect this bias to be small and non-differential, and therefore most likely to have only slightly diluted the reported effects. Since assessment of the predictors was based on self report questionnaires, bias may be expected at that level as well. However,

perception of the employee of his/her health and work situation may be more important than objective assessment in relation with subsequent long term sickness absence[6] and self reported psychosocial work environment was found to predict sickness absence as well as more objective measurements.[5]

Sickness absence is a complex phenomenon which is influenced by more factors than health and psychosocial work environment alone.[3,5,7,27,28] Nevertheless, our study indicates that both indicators of health problems and psychosocial work environment identify employees at risk for long term sickness absence in employees that visited OP and/or GP in relation to work. Predictors of sickness absence in employees who visited only the OP in relation to work were comparable to predictors in employees who visited only the GP or visited both the GP and/or OP in relation to work. The position of OPs and GPs in the Dutch health system might explain this finding, since they can both be consulted by employees concerning work related problems. While OPs and GPs may both be likely to pay attention to employees' perceptions of their work environment when employees visit in relation to work, results of this study indicate that not only psychosocial work environment but also presence of indicators of health problems (especially presence of at least one long term disease) are important to take into account, regarding detection of employees at risk for long term sickness absence. Future studies are necessary to determine the best role for OPs and GPs in possible interventions for the prevention of long term sickness absence when they are confronted with this population at risk.

ACKNOWLEDGEMENTS

The Maastricht Cohort Study about Fatigue at Work is part of the Netherlands concerted action on 'Fatigue at Work' granted by the Netherlands Organization for Scientific Research (NWO). The work presented in this paper was and is currently supported by the Netherlands Organization for Scientific Research (NWO grant no. 580-02.255).

REFERENCES

1. Grundemann, RWM, Vuuren CV. Preventing absenteeism at the workplace: a European portfolio of case studies. Luxembourg: European Foundation for the Improvement of Living and Working Conditions, Office for Official Publications of the European Communities, 1988.
2. Davidson MJF. Legal aspects. ABC of workrelated disorders. BMJ 1996;313:1136-41.

3. North FM, Syme SL, Feeney A, et al. Psychosocial work environment and sickness absence among British civil servants: the Whitehall II study. Am J Public Health 1996;86:332-40.
4. Marmot M, Feeney A, Shipley M, et al. Sickness absence as a measure of health status and functioning: from the UK Whitehall II Study. J Epidemiol Community Health 1995;49:124-130.
5. North F, Syme SL, Feeney A, et al. Explaining socioeconomic differences in sickness absence: the Whitehall II Study. BMJ 1993;306:361-6.
6. Niedhammer I, Bugel I, Goldberg M, et al. Psychosocial factors at work and sickness absence in the Gazel cohort: a prospective study. Occup Environ Med 1998;55:735-41.
7. Voss M, Floderus B, Diderichsen F. Physical, psychosocial, and organisational factors relative to sickness absence: a study based on Sweden Post. Occup Environ Med 2001;58:178-84.
8. Muntaner C, Schoenbach, C. Psychosocial work environment and health in U.S. metropolitan areas: a test of the demand-control and demand-control-support models. Int J Health Services 1994;24:337-53.
9. Stansfeld SA, Fuhrer R, Head J, et al. Work and psychiatric disorder in the Whitehall II Study. J Psychosom Res 1997;43:73-81.
10. Karasek R, Theorell, T. Healthy work: stress, productivity and the reconstruction of working life. New York: Basic Books, 1990.
11. Dijk FJH van, Prins R. Occupational health care and work incapacitiy: recent developments in the Netherlands. Occup Med 1995;45:159-66.
12. Bültmann U, Kant IJ, Van Amelsvoort LGPM, et al. Differences in fatigue and psychological distress across occupations: Results from the Maastricht Cohort Study of Fatigue at Work. J Occup Environ Med 2001;43:976-83.
13. Kant, IJ, Beurksens AJHM, Schroër CAP, et al. De Maastrichtse Cohort Studie naar langdurige psychische vermoeidheid in de arbeidssituatie. [Maastricht Cohort Study about prolonged fatigue at work]. Tijdschrift voor bedrijfs- en verzekeringsgeneeskunde 2000;8:226-232.
14. Bültmann U, Kant IJ, Kasl SV, et al. Fatigue and psychological distress in the working population: psychometrics, prevalence and correlates. J Psychosom Res 2002;52:445-52 .
15. Goldberg DP, Williams P. A User's Guide to the General Health Questionnaire. Windsor: NFER-Nelson, 1988.
16. Koeter MWJ, Ormel J. General Health Questionnaire, Handleiding Nederlandse bewerking [General Health Questionnaire, Manual Dutch version]. Lisse: Swets & Zeitlinger, 1991.
17. Vercoulen JH, Swanink CM, Fennis JF, et al. Dimensional assessment of chronic fatigue syndrome. J Psychosom Res 1994;38:383-92.
18. Beurskens AJHM, Bültmann U, Kant IJ, et al. Fatigue among working people: validity of a questionnaire measure. Occup Environ Med 2000;57:353-7.
19. Bültmann U, De Vries M, Beurskens AJHM, et al. Measurement of prolonged fatigue in the working population: determination of a cut-off point for the Checklist Individual Strength. J Occup Health Psychol 2000;5:411-6.
20. Karasek RA. Job Content Questionnaire and User's Guide. Los Angeles (CA): University of Southern California, Department of Industrial and Systems Engineering, 1985.

21. Houtman I. Reliability and validity of the Dutch version of the Karasek Job Content Questionnaire. APA/NIOSH conference on Work, Stress & Health. Washington (DC): APA, 1995.
22. SPSS for Windows, version 10.0.5. Chicago: SPSS Inc, 1999.
23. Smulders PGW, Nijhuis FJN. The Job Demands-Job Control model and absence behaviour: Results of a 3-year longitudinal study. Work and Stress 1999;13:115-31.
24. Kristensen TS. Sickness absence and work strain among Danish slaughterhouse workers: an analysis of absence from work regarded as coping behaviour. Soc Sci Med 1991;32:15-27.
25. Vahtera J, Kivimäki M, Pennti J, et al. Effect of change in the psychosocial work environment on sickness absence: a seven year follow up of initially healthy employees. J Epidemiol Community Health 2000;54:484-93.
26. Marmot MG, Smith GD, Stansfeld S, et al. Health inequalities among British civil servants: the Whitehall II study. Lancet 1991;337:1387-93.
27. Briner RB. ABC of work related disorders: absence from work. BMJ 1996;313:874-7.
28. Whitaker S. The management of sickness absence. Occup Environ Med 2001;58:420-24.

Associations between fatigue attributions and fatigue, health, and psychosocial work characteristics: a study among employees visiting a physician with fatigue

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Occupational and Environmental Medicine 2003;60:i99-i104

ABSTRACT

Objectives
To study associations between characteristics of employees active at work and making a fatigue related visit to the general practitioner (GP) or occupational physician (OP) in terms of fatigue, physical health problems, mental health problems, psychosocial work characteristics and attributions of their fatigue complaints.

Methods
Self-report questionnaires from the Maastricht Cohort Study Fatigue at Work were used to measure fatigue (Checklist Individual Strength, Maslach Burnout Inventory-General Survey), physical health problems (chronic illness), mental health problems (Hospital Anxiety and Depression Scale), psychosocial work characteristics (Job Content Questionnaire) and fatigue attributions (somatic, psychological, none) in employees who made a fatigue related visit to the GP or OP over a six month period.

Results
In employees visiting only the GP, fatigue was an important reason to visit in one out of seven (13.9%) employees. These fatigue related visits were in particular associated with high fatigue levels and mental health problems. A psychological fatigue attribution was reported by 41.8%, a somatic fatigue attribution by 44.0%. On a multivariate level, mental health problems showed the strongest association with psychological fatigue attributions, over and beyond fatigue itself. No associations were found between fatigue attributions and psychosocial work characteristics. Attributional patterns appeared to be different between visitors of the GP and the OP.

Conclusions
Fatigue is a common reason among employees to consult a GP. Asking employees for their own fatigue attributions in terms of somatic or psychological causes may be useful for the GP - and possibly also the OP – to gather information about underlying health problems in employees active at work and making a fatigue related visit.

INTRODUCTION

Fatigue is a common complaint in both the general[1-3] and the working population.[4] Fatigue that becomes prolonged may lead to sick leave and work disability,[5] which can have serious consequences for both employers (e.g. costs due to loss of productivity) and employees (e.g. reduced income, social isolation), and costs of care provided by family members or friends of the fatigued patient (e.g. household activities).[6] In the general population, fatigue is found to be associated to not only a broad range of somatic conditions,[7] but also to mental health problems, especially in the form of depression and/or anxiety.[8,9] The presence of somatic conditions and anxiety and/or depression can also be directly associated to one another.[10-12] This complex relationship also applies to the working population. Psychosocial work characteristics including job demands, decision latitude and social support at work are found to be associated with the presence of fatigue, chronic illness and mental health problems.[13-15] Hence, fatigue in the working population can be intertwined with a broad range of other problems in the field of work and health.

In the Dutch health care system and in several other European countries, general practitioners (GPs) are gatekeepers for the general population, including the working population. Therefore, GPs are likely the first to be involved in the diagnostic process concerning employed fatigued patients. GPs are often confronted with patients in relation with fatigue. Percentages of fatigue in the general practice population range from 5% to 45%,[9] with fatigue either measured as a presenting complaint or as a "supporting" symptom – that is, one of the possible symptoms of a clinical condition.[16] To date, there are no specific data for the working population. However, since the working population comprises a substantial part of the general population (approximately 65 % in the Netherlands) it is assumed that GPs are also often confronted with employees with fatigue complaints. Furthermore, it is not only GPs that are likely to be regularly confronted with these patients. As in many other countries, Dutch employees also have the opportunity to visit their occupational physician (OP). From 1998, all Dutch companies and organizations have provided access to an OP for their employees. The task of the OP is not only reintegration of employees at sick leave, but also support of employees active at work but experiencing problems in their working situation.[17] When employees consult their OP in relation to their work, fatigue may be one of the complaints.

When employees make a fatigue related visit, the diagnostic process and support and/or treatment by the physician may be hindered by the intertwined relation between fatigue, health and work problems. First, a fatigue related visit may not

only be related to fatigue severity, but may also reflect different underlying health and work problems. Secondly, patients' own opinions about the cause of their fatigue complaints and subsequent fatigue attributions (for example, somatic, psychological) may be affected and diffused by this intertwined relationship. The latter may not only hinder a correct diagnosis but may also affect the patient compliance during treatment.

Little is known about how employed patients attribute their fatigue complaints.
In this study, we examined the associations between fatigue attributions, fatigue level, physical health problems (chronic illness), mental health problems (anxiety and/or depression), and psychosocial work characteristics (job demands, decision latitude, social support). The study was conducted within the Maastricht cohort study, a large epidemiological study on fatigue at work. Within this cohort, we focused on employees who were active at work (not on sick leave) and who made a fatigue related visit to a physician (GP, OP). Within this sub cohort, our main research questions were:

- Do employees who have consulted their GP with fatigue as a presenting or a supporting symptom differ from employees who did not consult their GP with fatigue as a presenting or a supporting symptom, in terms of fatigue level, health problems and psychosocial work characteristics?
- What are the associations between employees' own fatigue attributions (somatic, psychological) and fatigue, health problems and psychosocial work characteristics?
- Do these attributional patterns differ between employees who visited a GP and employees who visited an OP?

METHOD

Study population

Between May 1998 and January 2001, a large scale epidemiological cohort study addressing a broad range of work related, non-work related and individual factors possibly associated with fatigue, was conducted in The Netherlands. This Maastricht Cohort Study Fatigue at Work surveyed a population of over 12 000 employees at baseline from 45 different companies and organisations using self report questionnaires that were sent to the cohort participants every four months. Full details of design of the cohort study, baseline characteristics of the study population and a non-response analysis have been described elsewhere.[4,18] Data about having visited the GP and/or OP and fatigue attributions were gathered in the Maastricht Cohort Questionnaire of January 2001 (n=7482). Our study

population consisted of employees who were active at work and who made a fatigue related visit to the GP or the OP only. This population was selected in several steps. First, we excluded those cohort participants not actively at work (n=574) or with missing values regarding working status (n=80) or having visited the GP and/or OP (n=36). Employees who visited only the GP only were asked whether fatigue was in at least one visit an important reason to visit, with "yes" or "no" as the reply options. Employees who answered "yes" were defined as employees who made a fatigue related visit to the GP. For these employees, their own attributions of their fatigue complaints were checked using the question "according to you, what was the cause of your fatigue?", with "somatic", "psychological" or "don't know" as the reply options. The same sequence of questions was asked to indicate attributions of employees who made a fatigue related visit to only the OP.

Measurements

Fatigue

To determine the level of fatigue in the cohort participants, the self-report Checklist Individual Strength (CIS) was used.[19,20] This multidimensional questionnaire consists of 20 items covering several aspects fitting the concept of prolonged fatigue (for example, lack of concentration, fatigue severity). Subjects are instructed to indicate how they felt during the past 2 weeks. The response to each statement is scored on a seven point Likert scale, varying from 'yes, that is true' to 'no, that is not true'. A higher CIS total score (range 20-140) indicates a higher level of fatigue. Cronbach's alpha for the total CIS score was 0.96. To be able to determine the prevalence of fatigue in employees, a cut off point for fatigue for use in the working population was developed.[21] Using this cut-off point, employees scoring >76 are designated as probable fatigue cases, with a fatigue level that can be indicated as putting the employee 'at risk' for sick leave or work disability.

Work-related fatigue was assessed with the Dutch version of the Maslach Burnout Inventory-General Survey (MBI-GS).[22,23] The MBI-GS consists of three subscales: exhaustion (five items), cynicism (five items) and professional efficacy (five items). All items are scored on a seven point frequency scale, ranging from "0" (never) to "6" (daily). High scores on exhaustion and cynicism, and low scores on professional efficacy are indicative for burnout or work-related fatigue. According to the Dutch MBI-GS manual, subjects scoring in the highest quartile of exhaustion and either the highest quartile of cynicism or lowest quartile of professional efficacy are defined as burnout cases.[23]

Physical health problems
Physical health problems were measured by the presence of at least one chronic illness. Cohort participants reported whether they had one or more of an extensive list of 19 conditions with a somatic character as measured in May 2000, including heart problems, stroke, liver problems, diabetes, cancer, respiratory disorders, metabolic disorders, skin disorders, musculoskeletal problems, and severe consequences of an accident (for example, fractures).

Mental health problems
The Hospital Anxiety and Depression (HAD) Scale was used to measure the presence of anxiety and/or depression. The HAD Scale is a self report questionnaire, establishing the presence and severity of both anxiety and depression, providing a separate score for each.24 Both the HAD-anxiety (HAD-A) and the HAD-depression (HAD-D) subscale consists of seven items, with a range from 0 to 21. Cronbach's alpha was 0.84 for HAD-depression and 0.83 for HAD-anxiety. Employees were defined as being a probable case of having a mental health problem in the form of anxiety and/or depression when they scored 11 or higher on the HAD-anxiety and/or the HAD-depression subscale,25 which is suggested to be a proper threshold score for use in a general practice population.26

Psychosocial work characteristics
The subscales job demands (five items), decision latitude (also referred to as job control; nine items) and social support (eight items) of the Dutch version of the Job Content Questionnaire (JCQ) were measured in May 2000 and indicate scores on psychosocial work characteristics, reflecting the perception of employees of their psychosocial work environment.27,28 The responses on all items are scored on a four point Likert scale, varying from 'strongly disagree' to 'strongly agree'. After scale construction, the scale ranges for job demands, decision latitude and social support were 12-48, 24-96 and 8-32 and Cronbach's alphas were 0.70, 0.81 and 0.81, respectively. Job strain, referring to the combination of high scores on job demands and a low score on decision latitude (and optionally also a low score on social support) is particularly suggested to be associated with negative health effects.29,30 Employees scoring in the highest tertile of job demands and either in the lowest tertile of decision latitude or the lowest tertile of social support were defined as experiencing job strain.

Sociodemographic characteristics
Sociodemographic variables gender, age, educational level and living situation (living alone yes or no) were measured in the baseline questionnaire (May 1998) and were also taken into consideration in this study.

Statistical analyses

All data analyses were two tailed and were performed using SPSS version 10.0 for Windows. Employees with incomplete data were excluded from the analysis. Fatigue, health and psychosocial work characteristics of employees who made a fatigue related visit to the GP only were compared to the characteristics of employees who made a none-fatigue related visit to the GP only, using Fisher's exact test for the dichotomous variables and t tests for the continuous variables. For employees who made a fatigue related visit to the GP only, the relation between their fatigue attributions and their fatigue, health and psychosocial work characteristics were measured using ANOVA tests for the continuous variables and Chi-square tests for the dichotomous variables. In the ANOVA analyses, Hochberg's GT2 was used as the post hoc multiple comparison procedure, as the sample sizes of the three attribution groups were not equal.31 In the univariate Chi-square analyses comparing fatigue attributions, adjustment for multiple testing took place by taking into account differences of at least $p<0.01$ only. Next, a multinomial logistic regression analysis was conducted to examine whether a model including being a probable fatigue case, reporting at least one chronic illness, being a probable mental health problem case, and experiencing job strain was associated to reporting a somatic, psychological or no attribution, adjusted for sociodemographics. As a last step, fatigue attributions of employees having visited only the OP were compared to fatigue attributions of employees having visited only the GP.

RESULTS

Fatigue, health and psychosocial work characteristics of employees who made a fatigue related visit to the GP

Of the employees at work who visited only the GP during the past six months, 97.6% (n=2318) indicated whether their visit to the GP was fatigue related or not. Approximately one in seven of these employees (13.9%) made a fatigue related visit. Table 1 compares their characteristics to the employees who made a none-fatigue related visit to the GP only.

The results indicate that employees who made a fatigue related visit not only had a higher level of fatigue, but also had a higher level of anxiety and depression. Furthermore, a higher percentage of employees who made a fatigue related visit to the GP only, reported at least one chronic illness. A more negative perception of the work environment was also present, but only with a modest clinical signi-

ficance (for all three psychosocial work characteristics, the difference was less than 5%). No differences were found regarding sociodemographic variables.

Table 1 – Characteristics of employees who made a non-fatigue related visit or a fatigue related visit to the GP only (n=2318)

	Non-fatigue related visit (86.1%)	Fatigue related visit (13.9%)
Variable	Frequency / Mean (sd)	Frequency / Mean (sd)
Fatigue		
CIS total score ***	55.5 (23.6)	79.1 (25.0)
CIS case ***	21.4%	56.0%
MBI-GS case ***	14.3%	38.2%
Somatic health problems		
≥ 1 Chronic illness **	24.8%	34.2%
Mental health problems		
HAD-anxiety ***	4.8 (3.4)	8.0 (3.8)
HAD-depression ***	3.6 (3.5)	6.9 (4.4)
HAD case ***	9.7%	32.8%
Psychosocial work characteristics		
(JCQ total score per subscale)		
- Job demands ***	31.9 (5.4)	33.6 (5.6)
- Decision latitude **	72.4 (10.0)	70.5 (11.7)
- Social support ***	22.4 (3.0)	21.4 (3.5)
Job strain *	15.2%	20.5%
Sociodemographics		
Age in years	41.6 (8.5)	41.7 (8.2)
Gender (% male)	67.8%	65.4%
Low educational level	15.3%	15.8%
Living alone	8.7%	10.6%

CIS = Checklist Individual Strength; CIS-case = Probable fatigue case; MBI-GS = Maslach Burnout Inventory- General Survey; MBI-GS case = Probable work-related fatigue case; HAD = Hospital Anxiety and Depression Scale; HAD case = Probable mental health problem case; JCQ = Job Content Questionnaire. *t* test/Fisher's exact test : *p<0.05 **p<0.01 ***p<0.001.

Associations between fatigue attributions and fatigue, health and psychosocial work characteristics

As table 2 shows, 44.0% of employees who made a fatigue related visit to only the GP reported psychological fatigue attributions, 41.8% reported somatic attributions, and 14.2% reported to have no fatigue attributions.

Employees with a fatigue psychological attribution were found to have a higher level of fatigue, anxiety and depression than employees with a somatic attribution, and a higher percentage of probable cases of work-related fatigue were present among them. No differences were found regarding being a probable fatigue case four months ago, having at least one chronic illness and sociodemographics.

Table 3 shows that being a probable fatigue case (56.0%) and being a probable mental health problem case versus not being a probable fatigue case and not being a probable mental health problem case respectively, were associated to the attributional fatigue pattern in employees who made a fatigue related visit to only the GP.

Table 2 – Fatigue attributions in relation to fatigue, health, psychosocial work characteristics and sociodemographics of employees who made a fatigue related visit to the GP only (n=268)

Variable	Somatic attribution (41.8%)	Psychological attribution (44.0%)	Don't know attribution (14.2%)
Fatigue			
CIS total score ***	69.9 (23.8)	82.0 (25.11)	84.3 (21.3)
CIS case ***	41.3%	62.7%	65.8%
CIS case four months ago	41.0%	52.3%	57.1%
MBI-GS case *	28.9%	48.9%	39.1%
Somatic health problems			
≥ 1 Chronic illness	36.6%	28.0%	31.6%
Mental health problems			
HAD-anxiety ***	6.2 (3.2)	9.0 (3.6)	8.7 (3.6)
HAD-depression ***	5.1 (3.8)	8.2 (4.4)	6.6 (4.1)
HAD case ***	32.4%	64.3%	59.5%
Psychosocial work characteristics (JCQ total score on subscales)			
- Job demands	32.8 (5.8)	34.2 (5.5)	33.6 (4.9)
- Decision latitude	70.3 (11.6)	71.9 (11.1)	72.2 (10.7)
- Social support	21.5 (3.5)	21.6 (3.4)	21.7 (3.4)
Sociodemographics			
Age in years	41.3 (8.2)	41.6 (7.4)	40.7 (9.3)
Gender (% male)	62.2%	68.6%	57.9%
Low educational level	17.8%	9.8%	15.8%
Living alone	10.0%	12.7%	7.9%

CIS = Checklist Individual Strength; CIS-case = Probable fatigue case; MBI-GS = Maslach Burnout Inventory- General Survey; MBI-GS case = Probable work-related fatigue case; HAD = Hospital Anxiety and Depression Scale; HAD case = Probable mental health problem case; JCQ = Job Content Questionnaire.
t test/Chi square test, *p<0.05 **p<0.01 ***p<0.001.

A higher percentage of employees being a probable fatigue case or employees being a probable mental health problem case reported a psychological attribution (51.4% versus 36.4% and 58.8% versus 37.8%, respectively), while a higher percentage of employees not being a probable fatigue or mental health problem case reported a somatic attribution (52.9% versus 31.3% and 50.6% versus 21.3%, respectively). To a lesser extent, reporting at least one chronic illness (34.2%) versus reporting no chronic illness or experiencing job strain (20.5%) versus not reporting job strain also seemed to match with reporting a somatic or a psychological fatigue attribution respectively, but these associations were not significant.

Next, a multinomial logistic regression analysis was conducted to examine whether a model consisting of being a probable fatigue case, reporting at least one chronic illness, being a probable mental health problem case, or experiencing job strain was associated to the fatigue attributions of employees who made a fatigue related visit to only the GP, adjusted for sociodemographics. Since table 3 indicated a significant association between being a probable fatigue or mental health problem case and a psychological fatigue attribution, we chose the psychological fatigue attribution group as the reference group. Consequently, employees with a psychological fatigue attribution were compared to those with a somatic attribution and to those with no attribution.

Table 3 – Cases versus non-cases with respect to fatigue, chronic illness, mental health problems and job strain in relation to fatigue attributions of employees who made a fatigue related visit to the GP only (n=268)

	CIS case **		≥ 1 Chronic illness		HAD case ***		Job strain	
	Case	Non-case	Case	Non-case	Case	Non-case	Case	Non-case
Attributions								
Somatic	31.3%	52.9%	47.7%	39.0%	21.3%	50.6%	34.7%	42.3%
Psychological	51.4%	36.4%	38.3%	46.7%	58.8%	37.8%	49.0%	43.8%
Don't know	17.4%	10.7%	14.0%	14.3%	19.9%	11.6%	16.3%	13.9%

CIS = Checklist Individual Strength; CIS-case = Probable fatigue case; HAD = Hospital Anxiety and Depression Scale; HAD case = Probable mental health problem case.
Chi-square test, **p<0.01 ***p<0.001.

Being a mental health problem case turned out to be associated with how employees attribute their fatigue complaints (Chi square (df=2) = 8.99, p<0.05), over and beyond being a probable fatigue case. As shown by the results in table 4, this association was only present when comparing employees with a psychological fatigue attribution to employees with a somatic attribution.

Table 4 – Multinomial logistic regression of cases versus non-cases with respect to fatigue, chronic illness, mental health problems and job strain on a somatic, psychological (reference group) or no attribution of fatigue in employees who made a fatigue related visit to the GP only, adjusted for sociodemographics (n=268)

	Psychological versus somatic attribution	Psychological versus no attribution
Cases versus non-cases	OR (95% CI)	OR (95% CI)
CIS case	1.66 (0.87-3.20)	0.97 (0.38-2.47)
≥ 1 Chronic illness	0.56 (0.29-1.06)	0.76 (0.32-1.79)
HAD case	2.51 (1.16-5.42) *	0.65 (0.26-1.62)
Job strain	1.46 (0.67-3.20)	1.08 (0.40-2.91)

CIS = Checklist Individual Strength; CIS-case = Probable fatigue case; HAD = Hospital Anxiety and Depression Scale; HAD case = Probable mental health problem case.
Chi-square statistic, *p<0.05.

Differences between visiting only the GP and only the OP

In contrast to one out of three (35.0%) employees visiting only the GP, a minority (3.0%) of the employees at work indicated visiting only the OP. However, when compared to employees who made a fatigue related visit to the GP only, twice as many employees made a fatigue related visit to the OP only (29.0% versus 13.9%). Furthermore, the vast majority (73.9%) of those employees who made a fatigue related visit to the OP only attributed their fatigue complaints to a psychological cause, followed by 19.6% to a somatic cause, and the minority (6.5%) reported no attribution for their fatigue complaints, while this attribution pattern was 44.0%, 41.8% and 14.2% for employees who made a fatigue related visit to only the GP (see table 1). Because of small sample sizes for the somatic fatigue attribution group (n=9) and the no fatigue attribution group (n=3) in employees who made a fatigue related visit to only the OP, it was not possible to test for statistical differences on the level of the employees' health and work characteristics.

DISCUSSION

To our knowledge, our study was the first to examine fatigue attributions of patients in a working population. In our study population consisting of employees actively at work, a high proportion of employees have consulted their GP for fatigue as a presenting or supporting symptom in the previous six months. In these employees, not only higher levels of fatigue but also more indicators of mental health problems, and to a lesser extent of physical health problems and a negative perception of the psychosocial work environment were present. Hence, establishing that a visit is fatigue related is only moderately effective in getting more insight in the diffuse relation between fatigue and health and psychosocial work characteristics. Asking employees making a fatigue related visit about their own fatigue attributions seems to be more helpful in evaluating which health problems may be present besides fatigue itself. Especially reporting a psychological fatigue attribution was associated with the presence of not only a higher fatigue level, but also with a higher level of anxiety and/or depression as mental health problems. Furthermore, the finding that being a probable health problem case instead of being a probable fatigue case matched with reporting a psychological attribution. Possibly, this finding may indicate that a psychological fatigue attribution is more likely to result from the presence of mental health problems than from the presence of fatigue itself.

Several other studies examined fatigue attributions in patients reporting fatigue complaints to the GP.[8,32,33] The finding that an almost equal proportion of

employees who made a fatigue related visit to the GP attributed their fatigue to somatic or psychological problems supports evidence from other studies undertaken in the community, for example Ridsdale and colleagues.[34] It is noteworthy that physical attributions of fatigue are more widespread in secondary and tertiary care patients than in primary care patients.[35-37] This is an interesting finding, as it might indicate that the greater openness of patients to psychological as well physical interpretations for their symptoms in primary care is likely to make them more willing to participate in complex interventions in this context. Further research regarding interventions in primary care contexts is necessary to examine this possibility.

As our study comprised a working population, we were also interested in employees' perception of their work environment – that is, their psychosocial work characteristics. We found no association between fatigue attributions and psychosocial work characteristics. This is noteworthy, as a negative perception of the work environment is found to be associated with fatigue on both a cross sectional[13] and a longitudinal level.[14] Not finding an association between fatigue attributions and psychosocial work characteristics might have been due to comparing psychological to somatic attributions instead of comparing attributions in terms of being work related or not being work related. Alternatively, not finding an association might also indicate that employees do not take psychosocial work characteristics into account when attributing their fatigue complaints; possibly, psychosocial work characteristics are in particular taken into account by employees who are not actively at work anymore but are absent from work.

Because of the cross-sectional nature of this study and as the visit to the GP or OP could have taken place recently or a few months ago (with a maximum of six months), the results do not disentangle whether fatigue attributions influenced the decision to consult a physician, whether feedback from the physician influenced the employees' own fatigue attributions, or both. As all measures were based on self-report of the employees, we also cannot rule out that common method variance may have lead to spurious associations. However, these self-report measures can be considered as more relevant in this study than using objective measures, since we were interested in factors experienced by the employee in relation to a concrete action undertaken by those employees (consulting a physician). With respect to the generalisation of our findings, it should be mentioned that by selecting employees who were active at work (not on sick leave) and made a fatigue related visit to the GP or OP only, we focused on a selective and homogeneous group of employees. Our goal was to specifically examine the employees' own attributions of their fatigue complaints. By excluding those employees who were absent from work and/or consulted both the GP and OP, we

tried to diminish the influence of the labelling of GPs and OPs on the employees' own fatigue attributions.

It should be noted that although a considerably higher percentage of employees visited the GP than the OP (35.0% versus 3.0%), a more than twice high percentage of these employees made a fatigue related visit to the OP than to the GP (29.0% versus 13.9%), and that a higher percentage of employees who made a fatigue related visit to only the OP instead of only the GP reported a psychological fatigue attribution (73.0% versus 44.0%). Employees making a fatigue related visit to only the OP might report other levels of fatigue, health problems and/or psychosocial work characteristics than those visiting only the GP, but the number of OP visitors was too small to examine this. The finding that a far smaller number of employees visited the OP than the GP also calls for further research, for example, regarding how employees active at work perceive the role of the OP when compared to the role of the GP.

In conclusion, our study indicated that paying attention to employees' own fatigue attributions in terms of somatic or psychological causes may be useful in providing the GP - and possibly also the OP - more insight in underlying health problems in employees active at work and making a fatigue related visit, but not in underlying psychosocial work characteristics.

ACKNOWLEDGEMENTS

As a part of the Maastricht Cohort Study on Fatigue at Work, this study participates in The Netherlands concerted research action on 'Fatigue at Work' and is granted by The Netherlands Organization for Scientific Research (NWO grant no. 580-02.255, part I). The authors would like to thank Marcus Huibers for comments on an earlier draft of this paper.

REFERENCES

1. Chen MK. The Epidemiology of Self-Perceived Fatigue among Adults. Prev Med 1986;15:74-81.
2. Loge JH, Ekeberg O, Kaasa S. Fatigue in the general norwegian population: normative data and associations. J Psychosom Res 1998;45:53-65.
3. Pawlikowska T, Chalder T, Hirsch SR, et al. Population based study of fatigue and psychological distress. BMJ 1994;308:763-6.
4. Bültmann U, Kant IJ, Kasl SV, Beurskens AJHM, van den Brandt PA. Fatigue and psychological distress in the working population: psychometrics, prevalence and correlates. J Psychosom Res 2002;52:443-50.

5. Schroër CAP. De toename van arbeidsongeschiktheid wegens psychische aandoeningen (The increase of work disability due to mental disorders). Tijdschrift voor bedrijfs- en verzekeringsgeneeskunde (TBV) 1997;5:16-23.
6. Chisholm D, Godfrey E, Ridsdale L, et al. Chronic fatigue in general practice: economic evaluation of counselling versus cognitive behaviour therapy. Bri J Gen Pract 2001;51:15-8.
7. Tiesinga LJ, Dassen TWN, Halfens RJG. Fatigue: A summary of the definitions, dimensions, and indicators. Nurs Diagn 1996;7:51-62.
8. Cathebras PJ, Robbins JM, Kirmayer LJ, Hayton BC. Fatigue in primary care: prevalence, psychiatric comorbidity,illness behavior and outcome. J Gen Intern Med 1992;7:276-86.
9. Lewis G, Wessely S. The epidemiology of fatigue: more questions than answers. J Epidemiol Community Health 1992;33:191-8.
10. Hotopf M, Mayou R, Wadsworth M, Wessely S. Temporal relationships between physical symptoms and psychiatric disorder. Results from a national birth cohort. Br J Psychiatry 1998;173:255-61.
11. Kisely SR, Goldberg DP. Physical and psychiatric comorbidity in general practice. Br J Psychiatry 1996;169:236-42.
12. Verhaak PF. Somatic disease and psychological disorder. J Psychosom Res 1997;42:261-73.
13. Bültmann U, Kant IJ, Schroër CAP, Kasl SV. The relationship between psychosocial work characteristics and fatigue and psychological distress. Int Arch Occ Environ Health 2001;75:259-66.
14. Bültmann U, Kant IJ, van den Brandt PA, Kasl SV. Psychosocial work characteristics as risk factors for the onset of fatigue and psychological distress: Prospective results from the Maastricht Cohort Study. Psychol Med 2001;32:333-45.
15. Muntaner C, Schoenbach C. Psychosocial work environment and health in U.S. metropolitan areas: a test of the demand-control and demand-control-support models. Intern J Health Serv 1994;24:337-53.
16. Ridsdale L, A critical appraisal of the literature on tiredness, in General Practice; A Critical Reader, L. Ridsdale, Editor. London: W.B. Saunders Company Ltd, 1995.
17. Buijs PC, van Amstel RJ, van Dijk FJD, Guidance of sickness absence: cooperation of Dutch occupational physician and general practitioner. In: Systemes de Security sociale et d'assurance maladie: financement et implication dans la sante au travail (Social Security Systems and Health Insurance: financing and implication in occupational health), J.-F. Caillard and P. Westerholm, Editors. Toulouse: Octares Editions, 1999.
18. Kant IJ, Beurskens AJHM, Schroër CAP, et al. De Maastrichtse Cohort Studie naar langdurige psychische vermoeidheid in de arbeidssituatie (The Maastricht Cohort Study of prolonged Fatigue at Work). Tijdschrijft voor bedrijfs- en verzekeringsgeneeskunde 2000;8:226-32.
19. Beurskens AJHM, Bultmann U, Kant IJ, et al. Fatigue among working people: validity of a questionnaire measure. Occup Environ Med 2000;57:353-7.
20. Vercoulen JH, Swanink CM, Fennis JF, et al. Dimensional assessment of chronic fatigue syndrome. J Psychosom Res 1994;38:383-92.
21. Bültmann U, De Vries M, Beurskens AJHM, et al. Measurement of prolonged fatigue in the working population: determination of a cut-off point for the Checklist Individual Strength. J Occup Health Psychol 2000;5:411-6.

22. Maslach C, Jackson SE. Maslach Burnout Inventory manual. 2nd ed. Palo Alto (CA): Consulting Psychologists Press, 1986.
23. Schaufeli WB, Van Dierendonk D. UBOS, Utrechtse Burnout Schaal, Handleiding. Lisse: Swets Test Publishers, 2000.
24. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. Acta Psychiatr Scand 1983;67:361-70.
25. Wilkinson MJB, Barczak P. Psychiatric screening in general practice: comparison of the general health questionnaire and the hospital anxiety depression scale. J R Coll Gen Pract 1988;38:311-3.
26. Dowell AC, Biran LA. Problems in using the hospital anxiety and depression scales for screening patients in general practice. Br J Gen Pract 1990;40:27-8.
27. Houtman I. Reliability and validity of the Dutch version of the Karasek Job Content Questionnaire.APA/NIOSH conference on Work, Stress and Health. Washington (DC): APA, 1995.
28. Karasek RA, Job content questionnaire and users's guide. Los Angeles (CA): University of South California: Department of Industrial and Systems Engineering, 1985.
29. Karasek RA. Job Demands, Job Decision Latitude, and Mental Strain: Implications for Job Redesign. Adm Sci Q 1979;24:285-311.
30. Karasek RA, Theorell T. Healthy work: stress, productivity and the reconstruction of working life. New York: Basic Books, 1990.
31. Toothaker LE. Multiple comparison procedures. Sage university paper series on quantitative applications in the social sciences, 07-089. Newbury Park (CA): Sage, 1993.
32. Kirk J, Douglass R, Nelson E, et al. Chief complaint of fatigue: a prospective study. J Fam Pract 1990;30:33-41.
33. Ridsdale L, Mandalia S, Evans A, Jerrett W, Osler K. Tiredness as a ticket of entry - The role of patients' beliefs and psychological symptoms in explaining frequent attendence. Scand J Prim Health Care 1999;17:72-4.
34. Ridsdale L, Godfrey E, Chalder T, et al. Chronic fatigue in general practice: is counselling as good as cognitive behaviour therapy? A UK randomised trial. Br J General Practice 2001;51:19-24.
35. Deale A, Chalder T, Wessely S. Illness beliefs and treatment outcome in chronic fatigue syndrome. J Psychosom Res 1998;45:77-83.
36. Dendy C, Cooper M, Sharpe M. Interpretation of symptoms in chronic fatigue syndrome. Behav Res Ther 2001;39:1369-80.
37. Sharpe M, Hawton KE, Simkin S, et al. Cognitive behaviour therapy for the chronic fatigue syndrome: a randomized controlled trial. BMJ 1996;312:22-6.

The relation between pathological worrying and fatigue in a working population

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Journal of Psychosomatic Research, in press.

ABSTRACT

Objectives
This study aimed to explore cross-sectional and longitudinal associations between pathological worry and fatigue in a working population.

Methods
In employees with very low or very high fatigue levels, psychometrics of the Penn State Worry Questionnaire (measuring pathological worry) and the Checklist Individual Strength (measuring fatigue) were examined and their cross-sectional and longitudinal association was explored.

Results
Pathological worry and fatigue can be measured as different constructs. However, both constructs were also associated on a cross-sectional level. Pathological worry predicted fatigue level ten months later, but this association disappeared after adjustment for the cross-sectional association between pathological worry and fatigue.

Conclusions
Although they can be measured as different constructs, pathological worry and fatigue seem to be associated. When studying longitudinal relations between pathological worry and fatigue, their cross-sectional association should be taken into account. Pathological worry might not be a risk factor for fatigue per se, but might act more like a mediating factor.

INTRODUCTION

Fatigue is a common complaint in the working population.[1] Fatigue that becomes prolonged may lead to sick leave and work disability,[2] which can have serious consequences for both employer (e.g. costs due to loss of productivity) and employee (e.g. reduced income, social isolation). Possible preventive or therapeutic measures for prolonged fatigue rely on gaining insight in factors that may predict later fatigue levels. In light of this, associations between fatigue, psychosocial work characteristics and psychological distress are still subject of study within (occupational) psychiatry. Results of cross-sectional analyses in the Maastricht Cohort Study on Fatigue at Work, a large prospective epidemiological cohort study in a working population, indicated that fatigue was associated with chronic diseases,[3] psychological distress (referring mainly to depression and anxiety),[1] and psychosocial work characteristics (job demands, control and social support at work).[4] On a longitudinal level, when controlling for demographic and health-related variables, psychosocial work characteristics were found to be significant predictors for the onset of fatigue and psychological distress one year later.[5]

So far, longitudinal analyses of fatigue have as yet not been primarily focused on factors referring to individual characteristics of employees. However, studying individual characteristics may help to gain further insight into risk factors or mediating factors for fatigue and in identifying individuals at risk for fatigue. Therefore, studying individual characteristics may shed further light on the aetiology of fatigue and provide insight in possible preventive or treatment measures for fatigue. Within the broad range of individual characteristics that may be worthwile studying in association with fatigue, worrying is an individual characteristic that has been defined as 'a chain of thoughts and images, negatively affect-laden and relatively uncontrollable', suggesting that worry represents 'an attempt to engage in mental problem-solving on an issue whose outcome is uncertain but contains the possibility of one or more negative outcomes'.[6] Although worrying can be perceived as a common human experience that does not necessarily have to lead to negative consequences, worrying is also known to be the most frequent symptom reported by patients with psychological problems consulting doctors in family practice.[7] Furthermore, results from a growing number of studies suggest that worry may be relevant to a negative psychological health status in general.[8]

Pathological worry, also referred to as chronic, uncontrollable worry, is related to pathological mood states such as anxiety and depression.[9-12] Furthermore, pathological worry is not only a cardinal feature of one specific anxiety disorder, Generalised Anxiety Disorder (GAD)[13], but it is also indicated to be a feature of all

other anxiety disorders.[14,15] In fact, Borkovec[16] suggested that worry seems to be a significant contributor to the maintenance of anxiety, not only for GAD but for all the other anxiety disorders as well, thus further demonstrating the importance of research on possible outcomes of pathological worry.

Whereas the direct relation between pathological worry and fatigue has as yet not been studied, both anxiety and depression are often found to be associated with fatigue on a cross-sectional level in studies conducted in the community[17-19] or in primary care settings.[20-23] However, results of studies using factor analysis[24,25] showed that anxiety and depression still can be separated from fatigue. Similarly, pathological worry might be associated with fatigue, but still refer to another phenomenon than fatigue. Literature on prospective relations between anxiety and/or depression and subsequent fatigue is sparse.[18,19,22,23,26] Moreover, information about pathological worry has as yet not been gathered in the working population. The Maastricht Cohort Study on Fatigue at Work encompasses a prospective epidemiological study with fatigue as one of the main outcomes in a working population.[1,27] Within two subsamples of the Maastricht Cohort Study, we were able to examine associations between pathological worry and fatigue, taking the influence of variables possibly having an effect on level of fatigue in the working population (demographics, chronic conditions, sleep, psychosocial work environment) into consideration. The aim of this study was to examine cross-sectional associations between pathological worry and fatigue and to explore whether pathological worry is prospectively related to fatigue in a working population.

METHOD

Study population

Maastricht Cohort Study on Fatigue at Work

A large-scale epidemiological longitudinal cohort study, which addresses possible predictors and outcomes of fatigue in a working population has been conducted in The Netherlands between May 1998 and January 2001. The Maastricht Cohort Study on Fatigue at Work surveys a heterogeneous population of over 12,000 employees at baseline from 45 different companies and organisations.[1,28] Full details of the baseline characteristics and a non-response analysis have been described elsewhere.[1,27]

In total, nine self-report cohort questionnaires (one cohort questionnaire per each four months; each year, the May questionnaires contained information about exposure and outcome variables, while the shorter January and September

questionnaires contained mainly information about outcome variables) were used to collect data on not only a broad range of work-related variables possibly associated with fatigue, but on several non-work related and health-related variables as well. As the regular cohort questionnaires did not contain detailed information about pathological worrying, an additional questionnaire was used. The fourth follow-up questionnaire of the Maastricht Cohort Study (September 1999) was used to select two contrasting fatigue-subsamples: employees without fatigue or with a very low level of fatigue (Non/low-fatigued subsample) versus employees with a very high level of fatigue (Very fatigued subsample). Selection of these employees took place in several steps. In this study, we aimed to take into account the influence of chronic conditions on fatigue. It has been found that in the working population, that a broad range of chronic conditions can have an impact on fatigue in the working population.[3] Furthermore, chronic conditions can also be expected to have an effect on the presence of worrying. From the participants of the Maastricht Cohort Study, we excluded those employees who reported having a chronic condition in which fatigue is likely to be present as an accompanying somatic symptom (heart disease or hypertension, cirrhosis or hepatitis, diabetes, cancer, severe consequences of accident; as indicated in the cohort questionnaire in May 1999; n=241). Employees reporting other chronic conditions were deliberately still included in our study population, as we wanted to take into account the effect of conditions in which fatigue is less evident to represent an accompanying somatic symptom on the relation between pathological worrying and fatigue (see section potential confounding variables). Furthermore, employees of one big company were excluded (n=944), as employees of that company were too busy at the time of the data collection to fill in additional questionnaires. Of the resulting cohort participants (n=7771), we included those scoring below the 10th percentile (n=670) or above the 90th percentile (n=673) of the fatigue questionnaire. From both groups, 400 employees were selected at random, and these two contrasting fatigue subsamples (Non/low-fatigued subsample versus Very fatigued subsample) received an additional set of self-report questionnaires in March 2000, including a questionnaire measuring pathological worry. As both subsamples have also kept receiving the regular cohort questionnaires until January 2001, we were able to study the association between pathological worry and fatigue on both a cross-sectional and longitudinal level.

Measurements

Fatigue

To determine the degree of fatigue, the self-report Checklist Individual Strength (CIS)[1,28-30] was used. The CIS has been validated for use in the working population.[31] The CIS is a multidimensional questionnaire consisting of 20 items of which 11 items are negatively keyed and have to be recoded. The CIS covers

several aspects fitting in the concept of prolonged fatigue in the form of four different subscales: fatigue severity (eight items), motivation (four items), physical activity (three items) and concentration (five items). Participants are instructed to indicate how they felt during the last two weeks. The response to each statement is scored on a seven-point Likert scale, varying from 'yes, that is true' to 'no, that is not true'. A higher CIS-total score (range: 20-140) indicates a higher degree of fatigue. At baseline of the Maastricht Cohort Study, Cronbach's alpha of the CIS total score was 0.93.[1] To be able to determine the prevalence of fatigue in the total working population, a cut-off point for fatigue for use in the working population was developed in a pilot study.[32] Using this cut-off point, all those employees scoring >76 are designated as probable fatigue cases, with a fatigue level that can be indicated as putting the employee 'at risk' for sick leave or work disability.

Pathological worry

Pathological worry was measured using the Penn State Worry Questionnaire (PSWQ), a self-report questionnaire consisting of 16 items of which 5 items are negatively keyed and have to be recoded. The PSWQ assesses an individual's tendency to worry excessively and chronically and is not related to specific worry topics.[10,33] Participants are instructed to indicate how typical the statements are for them. The response to each statement is scored on a five-point Likert scale, varying from 'not at all typical of me' to 'very typical of me'. A total score is calculated by summing up all items. A higher PSWQ-total score (range: 16-80) indicates a higher degree of pathological worry. Cronbach's alphas have been shown to range between 0.86 and 0.95 in both clinical and nonclinical samples and test-retest correlations lie between 0.74 and 0.92 across intervals ranging from two to ten weeks.[10,34] The PSWQ seemed sensitive to change across an interval of six weeks as a result from therapeutic interventions in a population consisting of GAD-patients.[35]

A cut-off point for the PSWQ comparable to the existing cut-off point for the CIS is not available. However, a fair amount of studies (see[33] for an overview and more recently[36-42]) reported means and standard deviations of PSWQ total scores in healthy populations (mean 31-48, sd 9-13) or clinical populations (mean 53-68, sd 9-11). Based on a comparison of these scores, we defined a cut-off point of >55 for use in this study. Using this cut-off point implies that 1) participants with clinically relevant pathological worry are likely to be classified as cases, 2) participants without pathological worry or without clinically relevant pathological worry are likely to be classified as non-cases, and 3) participants from samples not selected on the presence of pathological worry but in whom worry is present in the form of high scores on the PSWQ, are likely to be included as cases.

Potential confounding variables

Several demographic, health-related and work-related variables known[1,3,4] or expected to be associated with fatigue, were selected as potential confounding variables. In the baseline questionnaire (May 1998), the respondents provided information about demographic characteristics gender, age and educational level (low, middle or high). In the questionnaire of May 2000, the cohort participants also ticked off whether they had one or more of a list of chronic problems in which fatigue may be present, but does not evidently represent an accompanying somatic symptom of the condition itself (respiratory disorders; metabolic disorders; skin disorders and musculoskeletal problems, especially back problems). Employees also indicated whether their sleep was good or bad during the last four months. Adjustment for psychosocial work environment took place using the subscales job demands, decision latitude and social support at work of the Dutch version of the Job Content Questionnaire (JCQ)[43,44].

Statistical analyses

All data analyses were two-tailed and were carried out using SPSS 10.0 for Windows.[45] Employees with incomplete data were excluded from the analyses. Two-tailed Mann-Whitney U tests (for continuous variables) and chi-square tests (for dichotomous/categorical variables) were used to test univariate differences between the Non/low-fatigued subsample and the Very fatigued subsample. Principal Component Analysis (PCA) with oblique rotation (as we expect pathological worry and fatigue to be correlated) was conducted for each subsample separately to explore whether the PSWQ and the CIS are able to measure pathological worry and fatigue as different constructs. First, we performed a PCA in which we selected factors with eigenvalues greater than 1.0, and we also performed a PCA restricted to a two-factor resolution. In correspondence with Steven's recommendation,[46] we only interpreted factor loadings with an absolute value greater than 0.3.

Next, the cross-sectional association between pathological worrying and fatigue was checked for the two subsamples together. Since pathological worry and fatigue were not measured at the same moment in time, we used the mean of the CIS scores on January 2000 and May 2000, thus [(CIS January 2000 + CIS May 2000)/2] , to estimate level of fatigue at the time level of pathological worry was measured (March 2000). As this mean fatigue score had a bimodal instead of a normal distribution, cross-sectional associations between pathological worrying and fatigue were checked using the cut-off scores for fatigue (CIS >76) and pathological worry (PSWQ >55).

To study the prospective relation between pathological worry (PSWQ as measured in March 2000) and later fatigue (CIS as measured in January 2001), a stepwise multiple linear regression analysis was conducted for each subsample separately. As the distribution of fatigue in the originally Non/low-fatigued subsample was strongly skewed to the right, we used a logarithmic transformation to base-e (the LN function) for fatigue as the outcome variable in that subsample. In each subsample separately, the PSWQ-score was entered in the first step (Model 1). All potential confounders were entered in the second step (Model 2). The cross-sectional association between pathological worry and fatigue, thus CIS-score estimated at the time PSWQ was measured, was entered in the third step (Model 3). Standardized Beta's were used to present the parameters in the model. As the regression model contains a fairly high amount of variables after the third step, intercorrelations between all variables were checked beforehand (using Pearson's Correlation Coefficient for the parametric data and Spearman's Rho for the non-parametric data), and no high collinearity was found.

RESULTS

Response levels

In total, 349 out of the 400 original members of the Non/low-fatigued subsample and 343 out of the 400 original members of the Very fatigued subsample filled in and returned the PSWQ, a response of 87% and 86% respectively. In a non-response analysis, no differences were found between responders and non-responders in terms of pathological worry and potential confounding variables, except that a higher level of psychological job demands was present in non-responders (mean 33.4, sd 4.6 versus mean 30.7, sd 5.2).

Characteristics of the fatigue subgroups

Table 1 shows the differences between employees in the Non/low-fatigued subsample and employees in the Very fatigued subsample with regard to measurements of demographic characteristics, fatigue, pathological worry, chronic conditions, sleep and psychosocial work environment. The results show that the two contrasting subsamples statistically differed from each other with respect to all variables, except the demographic characteristics. Furthermore, the mean scores and the percentile scores of fatigue between September 1999 and January 2001 indicate that regression to the mean is likely to be present in both the Non/low-fatigued subsample and the Very fatigued subsample.

Table 1- Characteristics of employees from the original Non/low-fatigued subsample versus characteristics of employees from the original Very fatigued subsample

	Non/low-fatigued		Very fatigued	
Variable	N	Mean (sd)/Frequency	N	Mean (sd)/Frequency
Gender (% female)	349	33.0%	343	29.1%
Low educational level	342	13.5%	333	18.0%
Age (in years)	349	41.1 (9.3)	343	42.3 (7.9)
Fatigue (CIS total score)				
September 1999 ***	349	23.2 (2.6)	343	105.0 (10.9)
- 10th, 25th, 50th, 75th, and 90th percentile		20; 21; 23; 26; 27		94; 96; 102; 111; 122
January 2000 ***	338	31.4 (16.8)	312	92.9 (21.4)
- 10th, 25th, 50th, 75th, and 90th percentile		20; 22; 26; 33; 47		63; 82; 94; 108; 117
May 2000 ***	321	30.6 (12.9)	303	90.8 (21.4)
- 10th, 25th, 50th, 75th, and 90th percentile		20; 22; 27; 34; 47		62; 80; 93; 104; 116
January 2001 ***	304	29.6 (13.9)	275	87.9 (25.0)
- 10th, 25th, 50th, 75th, and 90th percentile		20; 21; 26; 32; 42		49; 72; 92; 105; 117
Pathological worry (PSWQ total score)				
March 2000 ***	333	34.1 (9.6)	326	53.3 (12.6)
Presence chronic condition (% yes) ***	321	7.2 %	293	35.5 %
Sleep problems (% yes) ***	322	2.8 %	305	40.0 %
Psychological job demands	314	30.9 (5.3)	289	34.2 (5.7)
Decision latitude at work	323	77.6 (9.6)	299	69.2 (11.1)
Social support at work	320	23.9 (2.9)	299	21.2 (3.0)

CIS= Checklist Individual Strength; PSWQ = Penn State Worry Questionnaire.
Mann-Whitney U-test / chi-square test, *p<.05; **p<.01; ***p<.001

Psychometrics of the PSWQ and CIS

The principal component analysis (PCA) with oblique rotation without a restricted total number of factors yielded a six-factor solution for members of the original Non/low-fatigued subsample and a seven-factor solution for members of the original Very fatigued subsample. For the Non/low-fatigued subsample, the factors were as follows (with variance explained between brackets): 1) all fatigue severity items and all fatigue motivation items (34%), 2) ten out of the eleven positive items of pathological worry (12%), 3) all five negative items of pathological worry, of which one item was double loaded on factor six (6%), 4) all fatigue activity items (4%), 5) all fatigue concentration items (4%) and 6) one positive item of pathological worry (3%). For the Very fatigued subsample, the factors were as follows: 1) all fatigue severity items (32%), 2) all positive items of pathological worry (15%), 3) all fatigue activity items (7%), 4) all fatigue concentration items (5%), 5) all fatigue motivation items (5%), 6) four out of the five negative items of pathological worry (4%) and 7) one negative item of pathological worry (3%). No cross loadings were observed between the pathological worry and fatigue factors. As a second step, PCA with oblique rotation was conducted again, but this time with a forced two-factor solution for

both the Non/low-fatigued subsample and the Very fatigued subsample. Table 2 shows for both factors the items and factor loadings.

Table 2 - Two-factor solution after oblimin rotation as obtained by exploratory factor analysis

Questionnaires and their items	Factor 1[a]	Factor 2[a]
PSWQ (Penn State Worry Questionnaire)		
If I don't have enough time to do everything, I don't worry about it (R)	All items <.3[b]	<.3[b] / <.3[b]
My worries overwhelm me		.62 / .71
I don't tend to worry about things (R)		.31 / .55
Many situations make me worry		.75 / .79
I know I shouldn't worry about things, but I just can't help it		.70 / .78
When I am under pressure, I worry a lot		.69 / .70
I am always worrying about something		.68 / .80
I find it easy to dismiss worrisome thoughts (R)		.57 / .61
As soon as I finish one task I start to worry about everything else I can do		.64 / .66
I never worry about anything (R)		.50 / .59
When there is nothing more I can do about a concern, I don't worry about it any more		<.3 / .46
I've been a worrier all my life		.74 / .72
I notice that I have been worrying about things		.71 / .76
Once I start worrying, I can't stop		.73 / .76
I worry all the time		.66 / .84
I worry about projects until they are all done		.59 / .68
CIS (Checklist Individual Strength)		
I feel tired	.81 / .82	All items <.3[b]
I feel very active (R)	.83 / .77	
Thinking requires effort	.49 / .64	
Physically I feel exhausted	.74 / .76	
I feel like doing all kind of nice things (R)	.70 / .54	
I feel fit (R)	.73 / .78	
I do quite a lot within a day (R)	.47 / .44	
When I'm doing something, I can concentrate quite well (R)	.66 / .56	
I feel weak	.79 / .74	
I don't do much during the day	.64 / .48	
I can concentrate well (R)	.69 / .65	
I feel rested (R)	.76 / .83	
I have trouble concentrating	.71 / .63	
Physically I feel I am in a bad condition	.71 / .69	
I am full of plans (R)	.79 / .48	
I am tired very quickly	.86 / .77	
I have a low output	.63 / .58	
I feel no desire to do anything	.75 / .67	
My thoughts easily wander	.55 / .53	
Physically I feel in a good shape (R)	.78 / .73	

(R) = recoded item.
[a]Factor loading for the Non/low-fatigued subgroup / Factor loading for the Very fatigued subgroup;
[b]Factor loading is below 0.30.

The two-factor analysis resulted in yielding the total CIS and the total PSWQ as two separate factors, without cross loadings or double loadings. In both fatigue subsamples, the first factor comprised all fatigue items and the second factor the pathological worry items.

Cross-sectional dichotomous associations between pathological worry and fatigue

Table 3 shows the cross-sectional associations between dichotomised pathological worry scores and between dichotomised fatigue scores. Of the total n=698, n=140 employees had to beexcluded due to missing values on the level of worry in March 2000, level of fatigue in January 2000 or level of fatigue in May 2000.

Table 3 - Cross-sectional relation between dichotomised pathological worry scores (case: total score PSWQ > 55) based on the PSWQ score in March 2000 and dichotomised fatigue scores (case: total score CIS > 76) based on the mean of the fatigue scores in January 2000 and May 2000 (n=558)

	CIS	
	Case	No Case
PSWQ		
Case	53.1% (n=120)	3.9% (n= 13)
No Case	46.9% (n=106)	96.1% (n=319)

CIS = Checklist Individual Strength; PSWQ = Penn State Worry Questionnaire.

Of the employees found to be a fatigue case, 53.1% (n=120) were also designated as a pathological worry case. Of the employees found not to be a fatigue case, 96.1% (n=319) were also designated as not being a pathological worry case. Cross-overs from being a pathological worry case to not being a fatigue case (3.9%; n=13) were less common than cross-overs from not being a pathological worry case to being a fatigue case (46.9%; n=106). A chi-square test indicated that being a pathological worry case or not being a pathological worry case was associated with being a fatigue case or not being a fatigue case, respectively [$\chi_2(df=1)=179.16$, $p<0.001$] The strength of the association as indicated by Cramer's V was 0.57, $p<0.001$.

Longitudinal relation between pathological worry and fatigue

The results of the prospective regression analysis are presented in table 4 for the original Non/low-fatigued subsample and the original Very fatigued subsample separately. Complete information about fatigue, pathological worry and potential confounding variables was available for 253 (72%) members of the original Non/low-fatigued subsample, and for 204 (59%) members of the original Very fatigued subsample.

Table 4 – Longitudinal multivariate linear regression analysis with pathological worry in March 2000 as the predictor of log transformed fatigue in January 2001 as the outcome for the Non/low-fatigued (n=253) and the Very fatigued (n=204) subsamples separately

Variables	Non/low fatigued subsample	Very fatigued subsample
Model 1	*(R^2 0.14)*	*(R^2 0.06)*
PSWQ (March 2000)	β= 0.37***	β= 0.25**
Model 2	*(R^2 0.18)*	*(R^2 0.16)*
PSWQ (March 2000)	β= 0.33***	β= 0.23**
Model 3	*(R^2 0.43)*	*(R^2 0.36)*
PSWQ (March 2000)	β= 0.15**	β= 0.04
(CIS January 2000+CIS May 2000)/2	β= 0.57***	β= 0.53***

Model 1: PSWQ entered without adjustments;
Model 2: PSWQ entered with adjustment for confounders (gender, age, educational level, presence of chronic conditions, sleep problems, psychosocial work environment);
Model 3: PSWQ entered with adjustment for confounders and for level of fatigue during measurement of pathological worry;
β= Standardized Regression Coefficient; Non/low-fatigued = Original Non/low-fatigued subsample; Very fatigued = Original Very fatigued subsample; R^2= Adjusted R-square; PSWQ = Penn State Worry Questionnaire; CIS=Checklist Individual Strength; (CIS January 2000 + CIS May 2000)/2 = Mean of the CIS scores on January 2000 and May 2000.
*p<.05; ** p<.01, ***p<.001.

As the results in table 4 indicate, despite the likely effect of regression to the mean, in the univariate analysis (Model 1) a higher level of pathological worry predicted a higher level of fatigue ten months later not only in the Non/low-fatigued subsample, but also in the Very fatigued subsample. Pathological worry explained 14% of the variation in fatigue ten months later in the Non/low-fatigued subsample, and 6% in the Very fatigued subsample (as indicated by R^2, referring to the contribution of the predicting variables to explaining variance in later fatigue level). The effect of pathological worrying on fatigue ten months later was less strong, but still significant after taking into consideration the potential confounding variables (Model 2; the standardized regression coefficients dropped 11% for the Non/Low-fatigued subsample separately and 8% for the Very fatigued subsample separately). After adjusting for estimated level of fatigue at the time level of worry was measured (Model 3), the association between pathological worry and later fatigue was less significant for the Non/Low-fatigued subsample, and dropped to a non-significant level for the Very fatigued subsample. In this full model, the two fatigue variables explained 25 % of the variation in later fatigue level (as indicated by the change in R^2) in the Non/low-fatigued subsample and 20% of the variation in later fatige level in the Very fatigued subsample.

DISCUSSION

This study explored cross-sectional and longitudinal associations between pathological worry as an individual health-related characteristic and fatigue in a working population consisting of two subsamples originally characterised by a strong contrast as regards level of fatigue (the Non/low-fatigued subsample versus the Very fatigued subsample). To our knowledge, this was the first study in which pathological worry and fatigue were directly compared with each other in a working population.

In the univariate analyses, thus not yet taking into account the influence of other factors, the overall level of pathological worry was clearly lower in employees from the original Non/low-fatigued subsample than in employees from the original Very fatigued subsample. Comparing the PSWQ scores in our subsamples to those from other samples, the mean PSWQ score in our original Non/low-fatigued subsample (mean 34.1, sd 9.6) lies in the same range as PSWQ scores found in studies that screened on the absence of somatoform disorders, anxiety disorders and depression[36] or that examined non-clinical populations screened on the absence of GAD.[14,33] Furthermore, the mean PSWQ of our Very fatigued subsample (mean 53.3, sd 12.6) might represent a subclinical level of GAD, as this score is in line with scores found in partial GAD samples when using a GAD-questionnaire, scores found in clinical social phobia and scores found in clinical panic disorder samples when using structured interviews.[33]

Pathological worry and fatigue can be measured as different constructs when using the PSWQ and the CIS respectively, as indicated by the results from the factor analysis. This implies that the associations found between pathological worrying and fatigue are not likely to be due to overlap in the questionnaires. Regarding psychometrics of the PSWQ, most negative items loaded on another factor than the positive items. Although the PSWQ was constructed as a unidimensional questionnaire, several studies using factor analysis also found a two-factor solution for the PSWQ, in which the second factor comprised the negatively keyed items of the PSWQ, representing a 'not worry factor'.[14,47-49] Regarding psychometrics of the CIS, an explorative factor analysis including the CIS and the General Health Questionnaire (GHQ; a self-report questionnaire measuring likelihood of having a minor psychiatric disorder, especially depression and/or anxiety)[50] in the Maastricht Cohort Study not only indicated that different factors emerged for the CIS and the GHQ, but also that the majority of the CIS-items could be divided in the CIS subscales found in other study populations.[1]

Using cut-off points for the PSWQ and the CIS, we found that pathological worry could be distinguished from fatigue, but also tended to be associated with fatigue on a cross-sectional level. Whereas 53% of the fatigue cases in our study were also designated as a pathological worry case, the finding that not being a fatigue case was almost perfectly (96%) associated with not being a pathological case, might be due to using strict cut-off points for both the CIS and the PSWQ. The cross-sectional association between pathological worry and fatigue turned out to have a profound impact on the longitudinal relationship between pathological worry and fatigue ten months later. On a univariate level, a higher level of pathological worry was found to be related to a higher level of later fatigue, and this relation was still present after adjustment for demographics and for health-related and work-related variables associated with fatigue. One should note that in the Non/low-fatigued subsample, the prospective association between pathological worry and fatigue is also likely to be related to the regression to the mean of the longitudinal fatigue scores. In the Very fatigued subsample, however, regression to the mean would be expected to decrease rather than increase the likelihood of finding a positive association between level of pathological worry and level of fatigue. In light of this, it should also be noted that the loss to follow up regarding the fatigue score in January 2001 was higher in the Very fatigued subsample (non-response of 20%) than in the Non/low-fatigued subsample (non-response of 13%). Similarly, an explorative analysis of longitudinal non-response patterns in the total Maastricht Cohort Study population indicated that cohort participants with a high fatigue score at baseline were at a slightly higher risk to eventually drop out of the study.[27] Hence, even in a subsample where regression to the mean and loss to follow up can be expected to frustrate a positive relation between pathological worry and fatigue, pathological worrying was still associated with fatigue ten months later. However, this effect was clearly diminished or even disappeared in the multiple regression analyses when the cross-sectional association between pathological worry and fatigue was also taken into account. Compared to level of pathological worry, level of fatigue turned out to be a better predictor of level of fatigue ten months later.

We can ask the question whether the longitudinal results imply that pathological worry does not represent an individual characteristic possibly associated with subsequent fatigue. In light of this, it should be noted that pathological worry as measured with the PSWQ is very likely to refer to pathological worry as measured in a trait-like manner, since the PSWQ was developed to measure a tendency for an individual to worry excessively and chronically.[10,33] Hence, although this tendency does not necessarily have to be viewed as being a 'fixed' characteristic of an individual as therapeutic studies indicate that the PSWQ is sensitive to change,[35] pathological worry might be expected to be stable over time. Consequently, the follow up period of our study (ten months) might have been rather short.

Furthermore, measuring not only CIS scores but also PSWQ scores more than one moment in time would also shed more light on the stability of the PSWQ.

When compared to pathological worry as measured with the PSWQ, fatigue as measured with the CIS can be expected to behave more in a state-like than in a trait-like manner. In light of this, it also has to be kept in mind that our measurement of fatigue does not refer to a minor, everyday condition in the form of acute fatigue which is part of daily (working) life, but that our measurement fits in the concept of prolonged fatigue.[29,31,32] Nevertheless, pathological worry may still be expected to have a less dynamic character than fatigue. Following the assumption that pathological worry behaves more in a trait-like than in a state-like manner, it may be the case that pathological worry is not a risk factor per se for fatigue, but enlarges the risk of fatigue in combination with other factors related to other individual characteristics, health status or working situation of the employee.

Although it should be kept in mind that spurious associations caused by common method variance or the influence of a latent or 'third variable' such as negative affectivity cannot be ruled out as we had to rely on self-report questionnaires, our explorative study seems to provide preliminary evidence for a possible prospective association between pathological worry and fatigue in the working population. The results from our study in two contrasting fatigue subsamples from a working population indicate that, although they can be separated from each other, pathological worry and fatigue tend to go together. Consequently, when studying longitudinal relations between pathological worry and subsequent fatigue, the cross-sectional association between pathological worry and fatigue is important to take into account. For gaining further insight in pathological worry as a risk factor for subsequent fatigue or as a mediating factor, using a longer follow-up period and focusing on interactions between pathological worry and other factors associated with fatigue with data from a study population not limited in fatigue scores would be useful, when studying pathological worry as a possible preventive or therapeutic measure for prolonged fatigue.

ACKNOWLEDGEMENTS

As a part of the Maastricht Cohort Study on Fatigue at Work, this study participates in The Netherlands concerted research action on 'Fatigue at Work' and is granted by The Netherlands Organization for Scientific Research (NWO grant no. 580-02.255, part I). The authors would like to thank Karin Aretz for her assistance in the data acquisition.

REFERENCES

1. Bültmann U, Kant IJ, Kasl SV, Beurskens AJHM, van den Brandt PA. Fatigue and psychological distress in the working population: psychometrics, prevalence and correlates. J Psychosom Res 2002;52:445-52.
2. Schroër CAP. De toename van arbeidsongeschiktheid wegens psychische aandoeningen (the increase of work disability due to mental disorders). Tijdschrift voor Bedrijfs- en verzekeringsgeneeskunde 1997;5:16-23.
3. Franssen PML, Bultmann U, Kant IJ, van Amelsvoort LGPM. The association between chronic diseases and fatigue in the working population. J Psychosom Res 2003;in press.
4. Bültmann U, Kant IJ, Schroër CAP, Kasl SV. The relationship between psychosocial work characteristics and fatigue and psychological distress. Int Arch Occ Environ Health 2001;75:259-66.
5. Bültmann U, Kant IJ, van den Brandt PA, Kasl SV. Psychosocial work characteristics as risk factors for the onset of fatigue and psychological distress: Prospective results from the Maastricht Cohort Study. Psychol Med 2001;32:333-45.
6. Borkovec TD, Robinson E, Pruzinsky T, DePree JA. Preliminary exploration of worry: some characteristics and processes. Beh Res Ther 1983;21:6-16.
7. Goldberg DP, Bridges K, Duncan-Jones P, Grayson D. Dimensions of neurosis seen in primary-care settings. Psychol Med 1987;17:461-70.
8. Davey GCL, Tallis F. Worrying: perspectives on theory, assessment and treatment. Chichester: Wiley, 1994.
9. Metzger RL, Miller ML, Cohen M, Sofka M, Borkovec TD. Worry changes decision making: the effect of negative thoughts on cognitive processing. J Clin Psychol 1990;48:76-88.
10. Meyer TJ, Miller ML, Metzger RL, Borkovec TD. Development and validation of the Penn State Worry Questionnaire. Behav Res Ther 1990;28:487-95.
11. Starvevic V. Pathological worry in major depression: a preliminary report. Behav Res Ther 1995;33:55-6.
12. Borkovec TD, Ray WJ, Stoeber J. Worry: A cognitive phenomenon intimately linked to affective, physiological, and interpersonal behavioral processes. Cogni Ther Res 1998;22:561-76.
13. Assocation AP. Diagnostic and statistical manual of mental disorders (DSM-IV). Washington: American Psychiatric Association, 1994.
14. Brown TA, Antony MM, Barlow DH. Psychometic properties of the Penn State Worry Questionnaire in a clinical anxiety disorders sample. Behav Res Ther 1992;30:33-7.
15. Brown TA, Dowdall D, Cote G, Barlow DH, Worry and obsessions: the distinction between generalized anxiety disorder (GAD) and obsessive-compulsive disorder (OCD). In: G.C.L.Davey & F. Tallis (Ed), Worrying: Perspectives on theory, assessment and treatment. Chichester: John Wiley & Sons Ltd, 1994.
16. Borkovec TD, The nature, functions, and origins of worry. In: G.C.L.Davey & F. Tallis (Ed), Worrying: Perspectives on theory, assessment and treatment. Chichester: John Wiley & Sons Ltd, 1994.

17. Chen MK. The Epidemiology of Self-Perceived Fatigue among Adults. Prev Med 1986;15:74-81.
18. Merikangas K, Angst J. Neurasthenia in a longitudinal cohort study of young adults. Psychol Med 1994;24:1013-24.
19. Addington AM, Gallo JJ, Ford DE, Eaton WW. Epidemiology of unexplained fatigue and major depression in the community: The Baltimore ECA Follow-up, 1981-1994. Psychol Med 2001;31:1037-44.
20. Cathebras PJ, Robbins JM, Kirmayer LJ, Hayton BC. Fatigue in primary care: prevalence, psychiatric comorbidity,illness behavior and outcome. J Gen Intern Med 1992;7:276-86.
21. Katerndahl DA. Differentiation of Physical and Psychological Fatigue. Fam Pract Res J 1993;13:81-91.
22. Ridsdale L, Evans A, Jerrett W, et al. Patients with fatigue in general practice: a prospective study. BMJ 1993;307:103-6.
23. Van der Linden G, Chalder T, Hickie I, et al. Fatigue and psychiatric disorder: different or the same? Psychol Med 1999;29:863-8.
24. Kirk KM, Hickie IB, Martin NG. Fatigue as related to anxiety and depression in a community-based sample of twins aged over 50. Soc Psychiatry Psychiatr Epidemiol 1999;34:85-90.
25. Koschera A, Hickie I, Hadzi-Pavlovic D, Wilson A, Lloyd A. Prolonged fatigue, anxiety and depression: exploring relationships in a primary care sample. Australian and New Zealand Journal of Psychiatry 1999;33:545-52.
26. Hickie I, Koschera A, Hadzi-Pavlovic D, Bennett C, Lloyd A. The temporal stability and co-morbidity of prolonged fatigue: a longitudinal study in primary care. Psychol Med 1999;29:855-61.
27. Kant IJ, Bültmann U, Schroer CAP, et al. An epidemiological approach to study fatigue in the working population: The Maastricht Cohort Study. Occup Environ Med 2003;60:i32-9.
28. Kant IJ, Beurskens AJHM, Schroër CAP, et al. De Maastrichtse Cohort Studie naar langdurige psychische vermoeidheid in de arbeidssituatie (The Maastricht Cohort Study of prolonged Fatigue at Work). Tijdschrijft voor bedrijfs- en verzekeringsgeneeskunde 2000;8:226-32.
29. Vercoulen JH, Swanink CM, Fennis JF, et al. Dimensional assessment of chronic fatigue syndrome. J Psychosom Res 1994;38:383-92.
30. Vercoulen JHHM, Alberts M, Bleijenberg G. De Checklist Individuele Spankracht (CIS) (The Checklist Individual Strength (CIS)). Gedragstherapie 1999;32:131-6.
31. Beurskens AJHM, Bültmann U, Kant IJ, et al. Fatigue among working people: validity of a questionnaire measure. Occup Environ Med 2000;57:353-7.
32. Bültmann U, De Vries M, Beurskens AJHM, et al. Measurement of prolonged fatigue in the working population: determination of a cut-off point for the Checklist Individual Strength. J Occup Health Psychol 2000;5:411-6.
33. Molina S, Borkovec TD, The Penn State Worry Questionnaire: psychometric properties and associated characteristics. In: G.C.L.Davey & F. Tallis (Ed), Worrying: Perspectives on theory, assessment and treatment. Chichester: John Wiley & Sons Ltd, 1994.
34. Ladouceur R, Freeston MH, Dumont J, et al. The Penn State Worry Questionnaire: Psychometric properties of a French translation.Annual Convention of the Canadian Psychological Association. Quebec City, Canada, 1992.

35. Borkovec TD, Costello E. Efficacy of Applied Relaxation and Cognitive-Behavioral Therapy in the Treatment of Generalized Anxiety Disorder. J Cons Clin Psychol 1993;61:611-9.
36. Van Rijsoort S, Vervaeke G, Emmelkamp P. De Penn State Worry Questionnaire en de Worry Domains Questionnaire: eerste resultaten bij een normale Nederlandse populatie (The Penn State Worry Questionnaire and the Worry Domains Questionnaire: first results in a normal Dutch population). Gedragstherapie 1997;30:121-8.
37. Stober J. Reliability and validity of two widely-used worry questionnaires: self-report and self-peer convergence. Person Indiv Diff 1998;24:887-90.
38. Stober J, J B. Weekly assessment of worry: an adaptation of the Penn State Worry Questionnaire for monitoring changes during treatment. Beh Res Ther 1998;36:645-56.
39. Wells A, Papageorgiou C. Relationships between worry, obsessive-compulsive symptoms and meta-cognitive beliefs. Beh Res Ther 1998;36:899-913.
40. Joormann J, Stöber J. Somatic symptoms of Generalized Anxiety Disorder from the DSM-IV: Associations with pathological worry and depression symptoms in a nonclinical sample. J Anx Disorders 1999:491-503.
41. Kerkhof A, Hermans D, Figee A, et al. De Penn State Worry Questionnaire en de Worry Domains Questionnaire: eerste resultaten bij Nederlandse en Vlaamse klinische en poliklinische populaties (The Penn State Worry Questionaire and the Worry Domains Questionnaire: first results in Dutch clinic and outpatient populations). Gedragstherapie 2000;33:135-46.
42. Stober J, Joormann J. Worry, procrastination, and perfectionism: differentiating amount of worry, pathological worry, anxiety, and depression. Cogn Ther Res 2001;25:49-60.
43. Karasek RA, Job content questionnaire and users's guide. Los Angeles (CA): University of South California: Department of Industrial and Systems Engineering, 1985.
44. Houtman I. Reliability and validity of the Dutch version of the Karasek Job Content Questionnaire.APA/NIOSH conference on Work, Stress and Health. Washington (DC): APA, 1995.
45. Inc. S, SPSS Base 10.0 for Windows User's Guide. 1999, SPSS Inc.: Chicago IL.
46. Stevens JP. Applied multivariate statistics for the social sciences (second edition). Hilsdale, NJ: Erlbaum; 1992.
47. Stober J. Besorgnis: Ein Vergleich dreier Inventare zur Erfassung algemeiner Sorgen (Worrying: a Comparison of three questionnaires concerning everyday worries). Zeitschrift für Differentielle und Diagnostische Psychologie 1995;16:50-63.
48. Van Rijsoort S, Emmelkamp P, Vervaeke G. The Penn State Worry Questionnaire and the Worry Domains Questionnaire: structure, reliability and validity. Clin Psychol Psychother 1999;6:297-307.
49. Fresco DM, Heimberg RG, Mennin DS, Turk CL. Confirmatory analysis of the Penn State Worry Questionnaire. Beh Res Ther 2002;40:313-23.
50. Goldberg DP, Williams P, A user's guide to the General Health Questionnaire. Windsor: NFER-Nelson, 1988.
51. Van Amelsvoort LGPM, Beurskens AJHM, Kant IJ, Swaen GMH. The effect of non-random loss to follow-up on group mean estimates in a longitudinal study. Eur J Epidemiol 2003; in press.

Anxiety and depression in the working population using the HAD scale: Psychometrics, prevalence and relationships with psychosocial work characteristics

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Submitted for publication

ABSTRACT

Objectives

This study examines anxiety and depression on two different severity levels among employees participating in the epidemiological Maastricht Cohort Study on Fatigue at Work (n=7482), and examined whether psychosocial work-related determinants for both categories of mental health problems may differ.

Methods and Results

A principal component analysis indicated that the self-report Hospital Anxiety and Depression (HAD) scale enables measuring anxiety and depression as separate constructs among employees. On a subclinical level, prevalences of anxiety and depression were both considerable: anxiety prevalences were 8.2% for males and 10.0% for females, and depression prevalences were 7.1% for males and 6.2% for females. Regarding self-reported psychosocial work characteristics, in multivariate regression analyses partly differential cross-sectional associations were found for anxiety and depression.

Conclusions

The results of this study provide suggestive evidence that diagnosing, preventing or managing anxiety and depression among employees may require focusing on different aspects of their psychosocial work environment.

INTRODUCTION

Mental ill-health is common in both the community and the working population.[1-4] Moreover, various studies have repeatedly shown that mental ill–health is associated with a substantial degree of functional disability and work impairment.[5-7] For example, one in every three work disability benefit recipients is classified as being disabled for work on mental grounds in the Netherlands.[8]

Several clusters of mental health problems can be distinguished. Both anxiety and depression have been shown to be related to a diminished performance and functioning of employees in the occupational setting.[9-14] Depressive and anxiety symptoms have often been investigated as separate mental health entities. Although depressive and anxiety disorders represent two separate categories of (minor) psychiatric disorders on a clinical level (APA 1994), we do know from community and clinical studies that measures of anxiety correlate fairly well with measures of depression.[15-19] In the working population, however, only a few studies used instruments that enable a direct distinction between depression and anxiety, thereby taking into account the severity of both mental health problems and their associations with occupational factors, among which the psychosocial work environment.[1,20] So far, most studies in the working population have used general measurements (for example the General Health Questionnaire) to examine the presence of mental ill-health, or have focused on only one specific type of mental health problem, most often depression.[21] Consequently, reporting prevalences of different levels of anxiety and depressive symptoms, and studying relationships between psychosocial work characteristics and depressive and anxiety symptoms have scarcely simultaneously taken place in one study. These findings leave several questions open for further study, such as: 'What is the prevalence of different severity levels of anxiety and depressive symptoms in the working population?', and 'Are anxiety symptoms conceptually distinct from depressive symptoms in the working population?' The latter question is also relevant in the light of preventive or treatment actions for anxiety and depression in the working population. Answering the questions requires instruments enabling the measurement of both anxiety and depressive symptoms on different severity levels within the working population.

In the present study, we used data from the large-scale epidemiological Maastricht Cohort Study on Fatigue at Work. Among a working population of 7472 employees, the Hospital Anxiety and Depression (HAD) scale was used to examine whether anxiety symptoms are conceptually different from depressive symptoms, and to determine prevalences of anxiety and depressive symptoms on different severity levels and in several subgroups. Furthermore, we examined

possible differential associations between psychosocial work characteristics and anxiety and depression. All analyses were conducted separately for men and women, as epidemiological and community studies indicate that in general, anxiety and depressive disorders are more prevalent among women than among men.[22]

METHOD

Study population

Between May 1998 and January 2001, a large-scale prospective epidemiological cohort study addressing a broad range of work related, non-work related, individual factors and (mental) health problems was conducted in The Netherlands. At baseline, the Maastricht Cohort Study on Fatigue at Work surveyed a population of 12,140 employees from 45 different companies and organizations, representing a baseline response rate of 45%. Information was obtained by self-report questionnaires that were sent to the cohort participants every four months. Full details about the design of the cohort study, baseline characteristics of the study population and a non-response analysis have been described elsewhere.[4,23] Data about anxiety and depression were gathered in the cohort questionnaire of January 2001. In total, 7472 employees, 2048 females (27.4%) and 5424 males (72.6%), completed and returned this follow up questionnaire (a response of 70% in comparison to the baseline population). In comparison to female cohort participants (mean 43.1 years, sd 8.3), male cohort participants (mean 38.7 years, sd 8.3) were younger [$t(7460)=20.4$, $p<0.001$]. Information about psychosocial work characteristics was gathered in the questionnaire of May 2000.

Measurements

Anxiety and depression

The Hospital Anxiety and Depression (HAD) scale was used to measure the presence of anxiety and/or depression. The HAD scale is a 14 item self-report questionnaire, assessing the presence and severity of both anxiety (HAD-A) and depression (HAD-D) separately.[24] Both the HAD-A and the HAD-D consist of 7 items and are scored on a four point Likert scale (0 to 3), resulting in a range of 0 to 21. Cronbach's alphas in our study population were for HAD-A .85 and .84 for females and males respectively, and for HAD-D .86 and .85 for females and males respectively. The Pearson intercorrelation between HAD-A and HAD-D was .74 for both genders.

Although the HAD scale was originally developed to identify caseness of anxiety disorders and depression among patients in nonpsychiatric hospital clinics,[24] the questionnaire was recently also found to perform well in assessing the symptom severity and caseness of anxiety disorders and depression in somatic, psychiatric and primary care patients and in the general population.[25] With respect to cut-off values, we followed suggestions posed by this review. Employees were defined as being a *possible case* of having an anxiety or depressive disorder when they scored 8 or higher on the HAD-A or on the HAD-D, respectively. The authors of the original HAD scale also proposed a higher threshold score for more clinically significant degrees of anxiety or depressive disorders.[24] In line with the author's suggestion, we defined employees as being a *subclinical case* of having an anxiety or depressive disorder when they scored 11 or higher on the HAD-A or on the HAD-D, respectively.

Psychosocial work characteristics

A validated Dutch version of the Job Content Questionnaire26 was used to measure psychological job demands (5 items), decision latitude (9 items) and social support at work (8 items) (Karasek, 1985). The responses for all items are scored on a four-point Likert scale, varying from 'strongly disagree' to 'strongly agree'. Tertile splits were used for psychological job demands and decision latitude, while social support was dichotomized at the median. To measure emotional demands at work, four items from a Dutch questionnaire about perception and judgement of work (i.e. being confronted with personally upsetting things, personally attacked or threatened, getting annoyed with others, moving work situations),27 and one self-formulated item (one or more shocking events at work during last year) were used. The response option for each item was yes/no. The five items were summed up to generate a total score, ranging from 0 to 5. We recoded emotional demands at work to no emotional demands (score 0), low emotional demands (score 1), and high emotional demands (score 2-5). Three other single items from the Dutch questionnaire on perception and judgment of work27 were used to measure the presence of a conflict with supervisor (yes/no), conflict with co-workers (yes/no), and job insecurity (yes/no). Furthermore, we measured whether participants occupied an executive function (yes/no), and whether they would describe their overall job satisfaction as positive (good/reasonable) or as negative (moderate/not good).

Sociodemographic and health characteristics

The respondents provided information on age, educational level (low, medium, high), living alone (yes/no), the presence of at least one chronic condition with somatic or psychosomatic characteristics (e.g. heart problems, diabetes, cancer, respiratory disorders, metabolic disorders, musculoskeletal problems), or psychological problems. Age and educational level were measured at baseline (May

1998), while the other sociodemographic and health characteristics were measured in the cohort questionnaire of May 2000.

Statistical analyses

Statistical analyses were performed with SPSS 10.0. Employees with incomplete data were excluded from the analyses. All analyses were stratified for gender. To explore whether the HAD-A and HAD-D are able to measure anxiety and depression as different constructs in the working population, we conducted a Principal Component Analysis (PCA). We used a PCA with an oblique rotation, as we wanted to take the correlation between anxiety and depression into account. As recommended by Kaiser,[28] we retained factors with eigenvalues greater than 1.0. These factors were checked on the presence of double loadings and cross loadings. Factor loadings above 0.3 were considered as statistically significant.
Continuous scores for both anxiety and depression and the prevalence of anxiety and depression within possible and subclinical cases were calculated for the total study population (n=7472). By means of stratifications for demographic characteristics and work and health status, continuous and dichotomized anxiety and depression score were also compared between subgroups of the total study population.

Next, we used multiple logistic regression analyses to study associations between psychosocial work characteristics and subclinical anxiety or depression cases. In these analyses, those employees who reported themselves absent from work (7.7%; n=572), reported working under modified conditions related to former sickness absence (for example fewer hours, modified tasks or other functions; 3.3%; n=245), and those with an unknown working status in January 2001 (1.0%; n=80), were excluded. In the remaining population consisting of employees active at work (n=6575), we wanted to focus on anxiety and depression complaints not yet labeled as morbidity or as comorbidity of chronic somatic problems. Therefore, besides taking into account chronic conditions as a potential confounder (see below), we also excluded employees reporting psychological problems as a category of chronic problems in the questionnaire of May 2000 (2.8%; n=187, with missing data in 0.2%; n=16). Consequently, the final population studied in the multiple regression analyses consisted of 6372 employees, with 1676 females (26.3%) and 4696 males (73.7%). For both anxiety and depression as the dependent variable, the logistic model consisted of three steps. In the first step, Odds Ratios (ORs) and their 95% Confidence Intervals (95% CI) were calculated for each psychosocial work characteristic separately. In the second step, additional adjustment took place for age, educational level, living situation and the presence of at least one chronic condition. As the correlation between anxiety and

depression was rather high (r=0.74), we adjusted in a final step for the continuous score on HAD-D or HAD-A when anxiety or depression was considered as a dependent variable, respectively.

RESULTS

Anxiety and depression as separate constructs in the working population

The principal component analysis (PCA) with oblique rotation without a restricted total number of factors yielded a two-factor solution, in which the first factor explained 46.8% of the variance and the second factor 8.2% of the variance. Table 1 shows the items and factor loadings of the HAD-D and the HAD-A. As the same picture emerged for male and female employees, the results are presented for both genders together.

Table 1 - Two-factor solution after oblimin rotation as obtained by exploratory factor analysis

		Factorloadings	
Item number questionnaire	Items per subscale*	**Factor 1****	**Factor 2****
	HAD-A		
1	I feel tense or 'wound up'	0.35	**0.46**
3	I get a sort of frightened feeling as if something awful is about to happen	0.03	**0.86**
5	Worrying thoughts go through my mind	0.17	**0.70**
7	I can sit at ease and feel relaxed	**0.58**	0.25
9	I get a sort of frightened feeling like 'butterflies' in the stomach	0.03	**0.70**
11	I feel restless as if I have to be on the move	0.27	**0.33**
13	I get sudden feelings of panic	0.11	**0.87**
	HAD-D		
2	I still enjoy the things I used to enjoy	**0.80**	0.00
4	I can laugh and see the funny side of things	**0.74**	0.09
6	I feel cheerful	**0.65**	0.19
8	I feel as if I am slowed down	**0.50**	0.32
10	I have lost interest in my appearance	**0.53**	0.05
12	I look forward with enjoyment to things	**0.83**	0.06
14	I can enjoy a good book or radio or TV programme	**0.74**	0.10

*All items have been recoded in the same direction beforehand; **Bold: highest loading for each item; HAD-A = Anxiety subscale of the Hospital Anxiety and Depression scale; HAD-D = Depression subscale of the Hospital Anxiety and Depression scale.

For all seven depression items, the highest loadings (ranging from 0.50 to 0.83) were present for the first factor. For six out of seven of the anxiety items, the highest factor loadings (ranging from 0.33 to 0.86) were present for the second factor. For one item from the HAD-D (item 8) and for one item from the HAD-A (item 1), clear double loadings (both above 0.3) were present. Only one clear cross

loading was found: one item from the HAD-A (item 7) reached a higher loading on the first factor than on the second factor. Since the first factor predominantly consists of items from the HAD-D and the second factor predominantly of items from the HAD-A, it seems justified to use the HAD-A and the HAD-D for measuring anxiety and depression as two distinctive constructs of mental health problems in our working population.

Prevalence of anxiety and depression in the working population

Table 2 shows that in the total study population, 20.7% of male employees were defined as possible anxiety cases, 18.7% as possible depression cases, 8.2% as subclinical anxiety cases, and 7.1% as subclinical depression cases. For female employees, these percentages were 22.4%, 15.8%, 10.0%, and 6.2%, respectively. In the subgroup of employees at work, the subgroup of employees not reporting a chronic condition, and the subgroup of employees not reporting chronic psychological problems, the percentage of subclinical cases for males varied between 6.2% and 8.0% for anxiety and between 1.2% and 6.8% for depression. For females, the percentage of subclinical cases in these groups varied between 8.5% and 9.4% for anxiety, and between 4.9% and 5.6% for depression.

Overall and irrespective of gender, a higher level of both anxiety and depression, and a higher percentage of possible and subclinical anxiety and depression cases was found in employees not at work or with health problems. Furthermore, only living alone versus not living alone in male employees, and educational level (low/medium/high) in female employees did not reveal significant differences in terms of anxiety or depression scores.

Psychosocial work characteristics in male employees

Table 3 shows that in male employees all psychosocial work characteristics were associated with subclinical anxiety (model 1), with the highest OR for high emotional demands (OR=4.24; 95% CI 3.15-5.72), and the lowest OR for having an executive function (OR=1.37; 95% CI 1.04-1.81). After adjustment for sociodemographics and the presence of a chronic condition (model 2), all these associations except for having an executive function were still significant. The highest OR was still found for high emotional demands (OR=4.08; 95% CI 3.01-5.52), and the lowest OR for job insecurity (OR=1.71; 95% CI 1.23-2.37). Additional adjustment for the continuous score on HAD-D (model 3) resulted in a reduction in size of all ORs. Only three ORs remained significant: high emotional demands (OR=1.95; 95% CI 1.37-2.77), negative job satisfaction (OR=1.54; 95% CI 1.09-2.18), and high psychological job demands (OR=1.49; 95% CI 1.01-2.20).

Table 2 – Levels and prevalences of anxiety and depression for males and females separately, stratified for being at work, reporting at least one chronic condition, reporting psychological problems, living alone, educational level, and age group

	Males (n=5424)					
	HAD-A			HAD-D		
	Mean score (sd)	Possible case (%)	Subclinical case (%)	Mean score (sd)	Possible case (%)	Subclinical case (%)
Total level	4.9 (3.6)	20.7	8.2	4.0 (3.8)	18.7	7.1
At work:	***	***	***	***	***	***
- No (7%)	5.5 (4.8)	37.3	20.8	5.7 (4.7)	31.4	17.4
- Yes	3.4 (3.5)	19.5	7.2	3.9 (3.7)	17.7	6.4
Chronic condition	***	**	***	***	***	***
- Yes (21%)	6.1 (4.0)	32.3	14.4	5.2 (4.1)	29.0	11.4
- No	4.5 (3.4)	17.6	6.5	3.7 (3.6)	15.9	6.0
Psychological problems:	***	***	***	***	***	***
- Yes (4%)	9.2 (4.2)	60.2	35.4	8.0 (4.6)	52.7	29.7
- No	4.7 (3.5)	19.4	7.2	3.9 (3.7)	17.5	6.4
Living alone:				*		**
- Yes (11%)	5.0 (3.6)	22.3	9.8	4.4 (4.2)	21.1	10.4
- No	4.8 (3.6)	20.6	8.0	4.0 (3.7)	18.4	6.8
Educational level:	***	***	***	***	***	***
-Low (20%)	5.4 (4.0)	25.9	11.3	4.8 (4.1)	24.3	9.5
-Medium (41%)	4.8 (3.6)	20.7	8.0	4.0 (3.6)	19.4	7.3
-High (39%)	4.6 (3.4)	17.8	6.6	3.6 (3.6)	14.6	5.6
Age:	***	***	**	***	***	*
- 18-25 (2%)	3.9 (2.4)	8.3	-	2.4 (2.5)	6.1	1.2
- 26-35 (18%)	4.4 (3.3)	14.8	6.2	3.3 (3.5)	12.9	5.9
- 36-45 (39%)	5.0 (3.6)	22.2	8.3	4.2 (3.9)	19.5	7.7
- 46-55 (37%)	5.1 (3.7)	23.2	9.5	4.4 (3.8)	21.8	7.7
- 55-65 (5%)	4.1 (3.7)	16.0	7.0	3.5 (3.5)	13.9	4.9

	Females (n=2048)					
	HAD-A			HAD-D		
	Mean score (sd)	Possible case (%)	Subclinical case (%)	Mean score (sd)	Possible case (%)	Subclinical case (%)
Total level	5.1 (3.7)	22.4	10.0	3.6 (3.7)	15.8	6.2
At work:	***	***	***	***	***	***
- No (11%)	6.7 (4.7)	35.3	20.3	6.3 (4.7)	30.1	17.2
- Yes	5.0 (3.5)	20.9	8.8	4.8 (3.5)	14.2	4.9
Chronic condition:	***	**	***	***	***	***
- Yes (24%)	5.9 (4.0)	28.2	14.5	4.5 (4.0)	21.6	9.8
- No	4.9 (3.6)	20.5	8.5	3.4 (3.5)	14.0	5.0
Psychological problems:	***	***	***	***	***	***
- Yes (4%)	8.7 (4.6)	51.8	33.7	6.8(5.1)	38.6	25.3
- No	5.0 (3.6)	21.1	9.0	3.5 (3.6)	14.9	5.4
Living alone:	*	**		**	**	*
- Yes (15%)	5.7 (4.0)	28.7	12.8	4.2 (4.2)	21.5	9.4
- No	5.0 (3.7)	21.2	9.4	3.5 (3.6)	14.7	5.6

(continued on next page)

Table 2 (continued)

	Females (n=2048)					
	HAD-A			HAD-D		
	Mean score (sd)	Possible case (%)	Subclinical case (%)	Mean score (sd)	Possible case (%)	Subclinical case (%)
Educational level:						
-Low (11%)	5.7 (4.2)	28.1	14.3	4.1 (3.4)	19.0	8.1
-Medium (54%)	5.0 (3.8)	21.7	10.2	3.6 (3.7)	16.1	6.4
-High (35%)	5.1 (3.5)	21.9	8.6	3.6 (3.5)	15.0	5.0
Age:		*		***	**	
- 18-25 (5%)	4.8 (3.8)	16.7	9.3	2.7 (3.4)	11.0	5.5
- 26-35 (32%)	5.0 (3.6)	20.9	9.2	3.4 (3.6)	14.4	5.1
- 36-45 (40%)	5.1 (3.7)	21.5	8.9	3.5 (3.6)	14.0	5.8
- 46-55 (20%)	5.6 (3.9)	28.1	13.3	4.4 (4.0)	23.1	8.6
- 55-65 (2%)	5.0 (3.9)	22.9	14.6	4.0 (3.7)	14.6	8.3

HAD-A = Anxiety subscale of the Hospital Anxiety and Depression Scale; HAD-D = Depression subscale of the Hospital Anxiety and Depression Scale; sd = standard deviation.
*p<0.05; **p<0.01; ***p<0.001.

Table 3 - Odds Ratios (OR) and 95% confidence intervals (95% CI) for subclinical anxiety among men by work characteristics[a]

Variable	Level	OR 1	95% CI	OR 2	95% CI	OR 3	95% CI
Psychological job demands	High	2.50***	1.79-3.49	2.60***	1.86-3.64	1.49*	1.01-2.20
	Medium	1.25	0.82-1.89	1.30	0.85-1.97	1.12	0.69-1.80
	Low	1		1			
Decision latitude	Low	2.07***	1.53-2.80	2.04***	1.48-2.82	1.19	0.82-1.73
	Medium	1.39*	1.00-1.91	1.36	0.98-1.88	1.06	0.72-1.54
	High	1		1			
Social support	Low	2.21***	1.70-2.87	2.13***	1.63-2.77	1.11	0.81-1.51
	High	1		1			
Emotional demands	High	4.24***	3.15-5.72	4.08***	3.01-5.52	1.95***	1.37-2.77
	Low	1.82***	1.30-2.54	1.77***	1.26-2.48	1.25	0.85-1.84
	No	1		1			
Conflict with:							
- Supervisor	Yes	1.99**	1.29-3.08	2.00**	1.29-3.10	1.11	0.65-1.87
	No	1		1			
- Co-worker	Yes	2.16***	1.52-3.07	2.13***	1.50-3.04	1.25	0.82-1.92
	No	1		1			
Executive function	Yes	1.37*	1.04-1.81	1.33	1.00-1.78	1.17	0.84-1.64
	No	1					
Job insecurity	Yes	1.85***	1.34-2.54	1.71**	1.23-2.37	1.23	0.84-1.80
	No	1					
Job satisfaction	Negative	3.80***	2.85-5.06	3.67***	2.75-4.91	1.54*	1.09-2.18
	Positive	1					

[a] n ranges between 4394 and 4486 due to missing values in the psychosocial work characteristics
OR 1: Crude Odds Ratios
OR 2: Adjusted for age, educational level, living alone, and presence of chronic condition
OR 3: Adjusted for continuous depression score.
* p<0.05, ** p<0.01, *** p<0.001.

In the total study population, the mean anxiety score was 4.9 (sd 3.6) for males and 5.1 (sd 3.7) for females, representing a non-significant statistical difference ($p>0.05$). The mean depression score was 4.0 (sd 3.8) for males and 3.8 for females (sd 3.7), which turned out to be statistically different [$t(7304)=7.14$, $p<0.001$]. As we did not expect to find that males scored higher on the HAD-D than females, we additionally compared the HAD-D scores of males to the score of females in a subpopulation consisting only of employees not working in shifts, working less than 36 hours, without a chronic condition, and not living alone (specific data not presented). In this subpopulation with a minimal confounding effect of health-related, work-related and sociodemographic variables, a statistical difference between mean level of depression for males (3.51, sd 3.36) and for females (3.23, sd 3.49) was no longer found ($p>0.05$).

Table 4 - Odds Ratios (OR) and 95% confidence intervals (95% CI) for subclinical depression among men by work characteristics[a]

Variable	Level	OR 1	95% CI	OR 2	95% CI	OR 3	95% CI
Psychological	High	2.52***	1.78-3.57	2.72***	1.91-3.86	1.42	0.94-2.15
job demands	Medium	1.28	0.83-1.97	1.35	0.88-2.09	1.22	0.74-2.01
	Low	1		1			
Decision	Low	2.58***	1.89-3.52	2.41***	1.73-3.37	1.61*	1.09-2.38
latitude	Medium	1.28	0.90-1.28	1.22	0.86-1.75	1.00	0.66-1.51
	High	1		1			
Social support	Low	2.81***	2.11-3.75	2.69***	2.02-3.59	1.86***	1.34-2.60
	High	1		1			
Emotional	High	4.47***	3.27-6.10	4.21***	3.07-5.78	1.60*	1.11-2.31
demands	Low	1.86**	1.30-2.64	1.76	1.24-2.51	1.15	0.78-1.72
	No	1		1			
Conflict with:							
- Supervisor	Yes	2.53***	1.67-3.84	2.49***	1.64-3.80	1.50	0.91-2.48
	No	1		1			
- Co-worker	Yes	2.48***	1.74-3.51	2.37***	1.67-3.38	1.45	0.95-2.21
	No	1		1			
Executive	Yes	1.39	1.03-1.86	1.27	0.94-1.27	1.13	0.80-1.61
function	No	1					
Job insecurity	Yes	1.80**	1.29-2.51	1.66**	1.18-2.34	1.09	0.73-1.64
	No	1					
Job satisfaction	Negative	4.58***	3.43-6.11	4.35***	3.26-5.82	2.05***	1.44-2.92
	Positive	1					

[a] n ranges between 4394 and 4486 due to missing values in the psychosocial work characteristics
OR 1: Crude Odds Ratios
OR 2: Adjusted for age, educational level, living alone, and presence of chronic condition
OR 3: Adjusted for continuous depression score.
* $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Table 4 shows that for subclinical depression in male employees, the associations found were comparable to those for subclinical anxiety in male employees in terms of crude ORs (model 1) and ORs after adjustment for sociodemographics (model 2). Additional adjustment for the continuous score on HAD-A (model 3), revealed

some differential effects for depression and anxiety. Similarly to subclinical anxiety all ORs reduced in size, and negative job satisfaction (OR=2.05; 95% CI 1.44-2.92) and high emotional demands (OR=1.60; 95% CI 1.11-2.31) were still significantly associated to subclinical depression. Contrary to subclinical anxiety, high psychological job demands were not found to be associated with subclinical depression anymore, while significant associations were found for low social support at work (OR=1.86; 95% CI 1.34-2.60) and low decision latitude (OR=1.61; 95% CI 1.09-2.38) instead.

Table 5 - Odds Ratios (OR) and 95% confidence intervals (95% CI) for subclinical anxiety among women by work characteristics[a]

Variable	Level	OR 1	95% CI	OR 2	95% CI	OR 3	95% CI
Psychological	High	2.54**	1.50-4.29	2.57**	1.51- 4.37	1.33	0.69-2.58
job demands	Medium	1.80*	1.01-3.21	1.82*	1.02-3.25	1.02	0.55-1.90
	Low	1		1			
Decision	Low	2.05**	1.31-3.23	1.95**	1.22-3.11	1.67	0.95-2.92
latitude	Medium	1.30	0.79-2.12	1.28	0.78-2.10	1.32	0.73-2.36
	High	1		1			
Social support	Low	2.76***	1.88-4.05	2.73***	1.86-4.03	1.53	0.97-2.43
	High	1		1			
Emotional	High	2.74***	1.70-4.43	2.66***	1.64-4.32	1.88*	1.06-3.32
demands	Low	1.57	0.91-2.72	1.57	0.91-2.72	1.18	0.61-2.25
	No	1		1			
Conflict with:							
- Supervisor	Yes	4.34***	2.34-8.05	4.08***	2.17-7.67	2.89**	1.30-6.46
	No	1		1			
- Co-worker	Yes	3.18***	1.74-5.79	3.09***	1.68-5.67	1.65	0.78-3.52
	No	1		1			
Executive	Yes	1.16	0.66-2.03	1.12	0.63-1.99	1.40	0.70-2.80
function	No	1					
Job insecurity	Yes	1.52	0.87-2.65	1.46	0.83-2.55	1.10	0.54-2.22
	No	1					
Job satisfaction	Negative	3.83***	2.33-6.30	3.81***	2.30-6.33	2.12*	1.14-3.94
	Positive	1					

[a] n ranges between 1484 and 1523 due to missing values in the psychosocial work characteristics
OR 1: Crude Odds Ratios
OR 2: Adjusted for age, educational level, living alone, and presence of chronic condition
OR 3: Adjusted for continuous depression score.
* $p<0.05$, ** $p<0.01$, *** $p<0.001$.

Psychosocial work characteristics in female employees

Table 5 shows that in female employees all psychosocial work characteristics except for having an executive function and job insecurity were significantly associated with subclinical anxiety (model 1). The highest OR was present for conflicts with supervisor (OR=4.34; 95% CI 2.34-8.05), and the lowest OR for medium level of psychological job demands (OR=1.80; 1.01-3.21). The same picture emerged after adjustment for sociodemographics and the presence of a

chronic condition (model 2). Additional adjustment for the continuous score on HAD-D (model 3) resulted in a reduction in size of all ORs, and only three ORs remained significant. As in male employees with subclinical anxiety, negative job satisfaction (OR=2.12; 95% CI 1.14-3.94) and high level of emotional demands (OR=1.88; 95% CI 1.06-3.32) were found to be associated with subclinical anxiety. In contrast to male employees with subclinical anxiety, no associations were found for high psychological job demands anymore. Instead, a significant association was found for conflicts with supervisor (OR=2.89; 95% CI 1.30-6.46).

Table 6 shows that for subclinical depression in female employees, the associations found were comparable to those for subclinical anxiety in female employees in terms of crude ORs (model 1) and ORs after adjustment for sociodemographics (model 2), except that the OR of decision latitude was non-significant in model 1. After additional adjustment for the continuous score on HAD-A (model 3), significant associations were no longer found.

Table 6 - Odds Ratios (OR) and 95% confidence intervals (95% CI) for subclinical depression among women by work characteristics[a]

Variable	Level	OR 1	95% CI	OR 2	95% CI	OR 3	95% CI
Psychological	High	4.10**	1.82-9.25	4.30***	1.90-9.77	1.84	0.76-4.49
job demands	Medium	1.98	0.79-4.95	2.03	0.81-5.09	1.15	0.42-3.13
	Low	1		1			
Decision	Low	1.49	0.83-2.69	1.32	0.72-2.42	0.74	0.37-1.56
latitude	Medium	0.98	0.52-1.88	0.92	0.48-1.77	0.76	0.37-1.56
	High	1		1			
Social support	Low	3.27***	1.92-5.56	3.28***	1.92-5.61	1.76	0.94-3.28
	High	1		1			
Emotional	High	2.39**	1.26-4.51	2.32*	1.22-4.42	1.29	0.57-2.96
demands	Low	1.67	0.82-3.40	1.67	0.82-3.41	1.25	0.59-2.66
	No	1		1			
Conflict with:							
- Supervisor	Yes	2.67*	1.11-6.48	2.72*	1.11-6.68	0.75	0.25-2.23
	No	1		1			
- Co-worker	Yes	3.50**	1.66-7.39	3.61**	1.69-7.71	1.95	0.77-4.94
	No	1		1			
Executive	Yes	1.15	0.54-2.54	1.00	0.46-2.19	1.09	0.45-2.65
function	No	1					
Job insecurity	Yes	1.82	0.91-3.65	1.69	0.84-3.40	1.48	0.66-3.31
	No	1					
Job satisfaction	Negative	3.13**	1.62-6.07	3.27**	1.67-6.38	1.09	0.48-2.45
	Positive	1					

[a] n ranges between 1484 and 1523 due to missing values in the psychosocial work characteristics
OR 1: Crude Odds Ratios
OR 2: Adjusted for age, educational level, living alone, and presence of chronic condition
OR 3: Adjusted for continuous depression score.
* p<0.05, ** p<0.01, *** p<0.001.

DISCUSSION

In this study, the Hospital Anxiety and Depression (HAD) Scale was used to measure anxiety symptoms separately from depressive symptoms in the working population, to identify employees with different severity levels of anxiety or depression, and to examine whether anxiety is conceptually different from depression in the working population. Although psychometrics of the HAD scale have been examined in several populations, only a few of them were samples from the community[29-31] instead of more specified primary care, medical, or psychiatric patient samples. To our knowledge, this is the first study to explore psychometric properties of the HAD scale in a working population. The results from the principal components analysis revealed two factors, with the first factor consisting predominantly of items from the HAD-D subscale, and the second factor consisting predominantly of items from the HAD-A subscale. This finding corresponds with results from a recent review about the validity of the HAD scale.[25] Based on 19 studies reporting factor analysis of the HAD scale, it was concluded that in most studies the HAD scale performed well as a bidimensional test. Similar to our results, the factor loadings found in these studies were not entirely consistent with the HAD-A and the HAD-D. Most consistently, one of the HAD-A items (item 7; "I can sit at ease and feel relaxed") showed relatively low loadings on the anxiety factor, and higher loadings on the depression factor instead. Hence, despite that the factors that were found did not match perfectly with the HAD-A and the HAD-D, it seems justified to use the HAD-A subscale and the HAD-D subscale to measure anxiety and depression as separate constructs in the working population.

For our total study population, the prevalence of subclinical anxiety was 8.2% for males and 10.0% for females, while prevalences for possible caseness were 20.7% and 22.4%, respectively. As we are not aware of other studies using questionnaires to measure anxiety prevalences in the working population for male and female employees separately, we compared the prevalences on a subclinical level to available results from other studies in working populations presenting results for males and females separately, based on structured interviews and reporting annual prevalences for anxiety disorders.[1,20,32] Overall, the subclinical anxiety prevalence for males found in our study seems comparable to these studies, while the subclinical anxiety prevalence for females in our study seems to be lower. The prevalence of subclinical depression was 7.1% for males and 6.2% for females. Similarly to subclinical anxiety, the subclinical depression prevalence for males in our study population seems comparable to other studies based on DSM-III-R classifications and presenting annual depression prevalences for male and female

employees separately,[1,12,20,32,33] while the subclinical depression prevalence for females in our study seems to be lower. Although different types of study samples, working populations, and type of prevalences studied complicate a direct comparison between our study and other studies conducted in the working population, these findings might indicate that the considerable percentage of employees being considered as a subclinical anxiety or depression case found in our study, may experience a clinically significant degree of anxiety or depressive disorder. As we are not aware of any other studies that used the HAD scale in the working population, it is difficult to determine whether it is justified to compare the subclinical prevalence found in our study directly to annual prevalences derived from standard diagnostic tools in the working population. In not only somatic, psychiatric and primary care patients but in the general population as well, the HAD scale was found to perform well in assessing the symptom severity and caseness of anxiety disorders and depression.[25] For a further validation of the subclinical anxiety and depression prevalences in the working population, a direct comparison between scores on the HAD-A subscale, the HAD-D subscale and standard diagnostic instruments in the working population is necessary to determine whether the short and easy to administer HAD scale may be a reliable and valid alternative for the more time consuming standard diagnostic tools.

When interpreting the anxiety and depression prevalences reported in our study, it must also be recognized that the overall response rate of the baseline cohort questionnaire in May 1998 (response 45%) and of the cohort questionnaire in January 2001 (response 70% in comparison to the baseline questionnaire) might have had an influence on the prevalences reported in our study. Although we did not have information about separate anxiety and depression scores in the baseline measurement of the Maastricht Cohort Study, a survey including an inquiry about fatigue among 600 non-responders at baseline indicated that the non-responders were less fatigued than the respondents.[23] As scores on the fatigue questionnaire were found to correlate fairly well ($r=0.62$)[4] with scores on the GHQ-12 (a questionnaire measuring the likeliness of having mental health problems, especially anxiety or depression[34]) in the Maastricht Cohort Study, an overestimation of the prevalences of anxiety and depression reported in our study cannot be ruled out. On the other hand, a non response analysis in the Maastricht Cohort Study after one year follow-up indicated that drop outs reported higher fatigue levels at baseline than respondents.[35] Possibly, this non response might have led to an underestimation of the prevalence of anxiety and depression reported in our study. Hence, it is difficult to estimate the effect of a response bias on the prevalences reported in our study.

Together with the negative consequences of mental disorders in the working population in terms of functional disability and work impairment,[5-7,9-14] the high

prevalence of both anxiety and depression in our study underlines the importance of studies focusing on suitable preventive and treatment tools for anxiety and depression in the working population. In the light of possible targets for primary or secondary prevention for anxiety and depression among employees, our study provides support for partly differential effects of psychosocial work characteristics on anxiety and depression. Specifically for subclinical anxiety, associations were found with high psychological job demands in males and with conflicts with supervisors in females. Specifically for subclinical depression, associations were found with low decision latitude and low social support for males. However, associations that were not specific for either subclinical anxiety or depression were also present. Results from the non response analysis during the first year follow-up of the Maastricht Cohort Study[23] suggest that the non-response of the Maastricht Cohort Study is not expected to have a relevant effect on the associations we found between psychosocial work characteristics and anxiety or depression. In the non response analysis, differences between non responders and responders were found with regard to demographic and health factors, but not with regard to psychosocial work characteristics.

Results of the few previous studies that also examined whether associations between psychosocial work characteristics and anxiety differed from associations between psychosocial characteristics and depression, correspond with results found in our study. Although using clinical classifications (DSM-III-R criteria) instead of a self-report questionnaire and different operationalisations of psychosocial work characteristics hamper a direct comparison with our results, it is noteworthy that results from a large scale epidemiological study about the presence of psychiatric morbidity in the general and working population in the Netherlands (the NEMESIS study) also support some diffential effects of psychosocial work characteristics on anxiety and depression.[20] Furthermore, it was also concluded from a study focusing on occupational factors of anxiety and depressive disorders in the French National Electricity and Gas Company that employees' perception of their work environment may contribute to the development of anxiety and depressive disorders.[1] Also in line with our results, it has recently[21] been suggested that job demands (possibly containing the threat to become overloaded) are specifically associated to anxiety symptoms, whereas low decision latitude (possibly implying loss of or insufficient control) is associated to depressive symptoms.[36,37] Contrary, in a study focusing on occupational covariates of mood and anxiety disorders in a French female ancillary staff population, no associations were found between psychosocial work characteristics and either anxiety or depressive disorders.[32] However, the specific occupational group, smaller study population (n=186), and relatively high impact of missing values in that study might have contributed to these contrasting findings.

Besides the possible effect of a response bias on the anxiety and depression prevalences reported in our study and the need to further examine the validity of the HAD scale in the working population, three other limitations of this study should be taken into consideration. Firstly, we had to rely on self-report measures for all variables measured in our study. Related to this, we cannot rule out the possibility that common method variance and the influence of a 'third factor' (for example, negative affectivity) has lead to biased prevalences and spurious associations between psychosocial work characteristics and anxiety or depression. In light of this, however, it is important to realize that even after adjustment for the continuous level of depression or anxiety, psychosocial work characteristics were still associated with subclinical anxiety or depression, respectively. Furthermore, in a large-scale study incorporating the measurement of mental health problems in an UK working population (the Whitehall II study), most associations found between psychosocial work characteristics and mental health were still present after adjustment for negative affectivity.[38] Secondly, the effect of a time frame of ten months between the measurement of the psychosocial work characteristics (May 2000) and the measurement of anxiety and depression (January 2001) on our study results will depend on the stability of the psychosocial work characteristics. However, in the total study population and within the used time frame, we expect the psychosocial characteristics measured in our study population to be relatively stable. A third point of attention is that anxiety and depression in the workforce can both be expected to be influenced by more than psychosocial work characteristics alone. Although sociodemographics and the presence of chronic diseases were taken into account in our study, other work-related factors (for example, effects of department restructuring), and factors outside work (for example, relational problems) were also found to be associated to either anxiety or depression in the working population,[1] underlining the multifactorial etiology of anxiety and depression in the working population.

In conclusion, the results of our study indicate that the HAD-A and HAD-D subscales enable a distinction between anxiety and depression in the working population, reveal a considerable prevalence of anxiety and depression among employees on a level that may be considered as clinically relevant, and also point in the direction of differential effects between psychosocial work characteristics and anxiety and depression. In terms of managing mental health problems in the working population, our study results also encourage longitudinal studies focusing on causal relationships between psychosocial work characteristics and mental disorders. As psychosocial work characteristics represent potentially modifiable workrelated conditions with a possible (partly) differential effect on anxiety and depression, the results of our study also promote examining whether improving employees' psychosocial work environment has a positive effect on the presence of anxiety or depression in the workforce.

ACKNOWLEDGEMENTS

As a part of the Maastricht Cohort Study on Fatigue at Work, this study participates in The Netherlands concerted research action on 'Fatigue at Work' and is granted by The Netherlands Organization for Scientific Research (NWO grant no. 580-02.255, part I).

REFERENCES

1. Chevalier A, Bonenfant S, Picot MC, et al. Occupational factors of anxiety and depressive disorders in the French National Electricity and Gas Company. J Occup Environ Med 1996;38:1098-1107.
2. Mason P, Wilkinson G. The prevalence of psychiatric morbidity - OPCS survey of psychiatric morbidity in Great Britain. Br J Psychiatry 1996;168:1-3.
3. Bijl RV, Ravelli A, van Zessen G. Prevalence of psychiatric disorder in the general population: Results of the Netherlands Mental Health Survey and Incidence Study (NEMESIS). Soc Psychiatry Psychiatr Epidemiol 2002;33:587-95.
4. Bültmann U, Kant IJ, Kasl SV, Beurskens AJHM, van den Brandt PA. Fatigue and psychological distress in the working population: psychometrics, prevalence and correlates. J Psychosom Res 2002;52:445-52.
5. Jenkins R. Mental health at work - why is it so under-researched? J Occup Med 1993;43:65-7.
6. Stansfeld S, Feeney A, Head J, et al. Sickness absence for psychiatric illness: the Whitehall II study. Soc Sci Med 1995;40:189-97.
7. Schroër CAP. De toename van arbeidsongeschiktheid wegens psychische aandoeningen (the increase of work disability due to mental disorders). Tijdschrift voor Bedrijfs- en verzekeringsgeneeskunde 1997;5:16-23.
8. Houtman I. Feiten en fabels op een rij. Werkdruk in cijfers (Work pace in numbers). Arbeidsomstandigheden 1999;75:2-5.
9. Broadhead WE, Blazer DG, George LK, Tse CK. Depression, disability days, and days lost from work in a prospective epidemiological survey. JAMA 1990;264:2524-8.
10. Conti DJ, Burton WN. The economic impact of depression in a workplace. J Occup Med 1994;36:983-8.
11. Martin JK, Blum TC, Beach SR, Roman PM. Subclinical depression and performance at work. Soc Psychiatry Psychiatr Epidemiol 1996;31:3-9.
12. Kessler RC, Frank RG. The impact of psychiatric disorders on work loss days. Psychol Med 1997;27:861-73.
13. Dewa C, Lin E. Chronic physical illness, psychiatric disorder and disability in the workplace. Soc Sci Med 2000;51:41-50.
14. Laitinen-Krispijn S, Bijl RV. Mental disorder and employee sickness absence: the NEMESIS study. Soc Psychiatry Psychiatr Epidemiol 2000;35:71-7.
15. Ormel J, Oldehinkel AJ, Goldberg DP, Hodiamont PPG, et al. The structure of common psychiatric symptoms: How many dimensions of neurosis? Psychol Med 1995;25:521-530.

16. Stein MB. Mixed anxiety-depression in a primary care clinic. J Affect Disord 1995;34:79-84.
17. Gorman JM. Comorbid depression and anxiety spectrum disorders. Depress Anxiety 1996;4:160-8.
18. Nisenson LG, Pepper CM, Schwenk TL, Coyne JC. The nature and prevalence of anxiety disorders in primary care. Gen Hosp Psychiatry 1998;20:21-8.
19. Regier DA, Rae DS, Narrow WE, Kaelber CT, Schatzberg AF. Prevalence of anxiety disorders and their comorbidity with mood and addictive disorders. Br J Psychiatry Suppl 1998;34:24-8.
20. Laitinen-Krispijn S, Bijl R. Werk, psyche en ziekteverzuim; aard en omvang van psychische stoornissen, ziekteverzuim en zorggebruik in de beroepsbevolking (Work, psyche and sickness absence; nature and magnitude of mental health problems, sickness absence and use of health care in the working population). Utrecht: Trimbos Instituut; 2002.
21. Stansfeld S. Work, personality and mental health (editorial). Br J Psychiatry 2002;181:96-8.
22. APA. Diagnostic and statistical manual of mental disorders (DSM-IV). Washington, DC: American Psychiatric Association; 1994.
23. Kant IJ, Bültmann U, Schroer CAP, et al. An epidemiological approach to study fatigue in the working population: The Maastricht Cohort Study. Occup Environ Med 2003;60:i32-9.
24. Zigmond AS, Snaith RP. The Hospital Anxiety and Depression Scale. Acta Psychiatr Scand 1983;67:361-70.
25. Bjelland I, Dahl AA, Haug TT, Neckelman D. The validity of the Hospital Anxiety and Depression Scale; An updated literature review. J Psychosom Res 2002;52:69-77.
26. Houtman I. Reliability and validity of the Dutch version of the Karasek Job Content Questionnaire.APA/NIOSH conference on Work, Stress and Health. Washington, DC: American Psychiatric Association, 1995.
27. Veldhoven M, Meijman T, Het meten van psychosociale arbeidsbelasting met een vragenlijst. De vragenlijst beleving en beoordeling van de arbeid (VBBA) (Questionnaire on Perception and Judgement of Work). Amsterdam: NIA, 1994.
28. Kaiser HF. The application of electronic computers to factor analysis. Educ Psychol Measurement 1960;20:141-51.
29. Jimenez CJ, Perez TA, Prieto FS, Navia-Osorio PM. Behavioural habits and affective disorders in old people. J Adv Nurs 1989;14:356-64.
30. Lisspers J, Nygren A, Soderman E. Hospital Anxiety and Depression Scale (HAD): some psychometric data for a Swedish sample. Acta Psychiatr Scand 1997;96:281-6.
31. Spinhoven P, Ormel J, Sloekers PP, et al. A validation study of the Hospital Anxiety and Depression Scale (HADS) in different groups of Dutch subjects. Psychol Med 1997;27:363-70.
32. Thiebaut R, Martin C, Grabot D, et al. Prevalence and occupational covariates of mood, anxiety disorders, and alcohol dependence in a French ancillary staff population. Eur Psychiatry 1999;14:210-6.
33. Bildt C, Michelsen H. Gender differences in the effects from working conditions on mental health: a 4-year follow-up. Int Arch Occup Environ Health 2002;75:252-8.
34. Goldberg DP, Williams P, A user's guide to the General Health Questionnaire. Windsor: NFER-Nelson, 1988.

35. Van Amelsvoort LGPM, Beurskens AJHM, Kant IJ, Swaen GMH. The effect of non-random loss to follow-up on group mean estimates in a longitudinal study. Eur J Epidemiol 2002;submitted.
36. Broadbent DE. The clinical impact of job design. Br J Clin Psychol 1985;24:33-44.
37. Warr PB. Decision latitude, job demands, and employee well being. Work Stress 1990;4:285-94.
38. Stansfeld SA, Fuhrer R, Shipley M, Marmot MG. Work characteristics predict psychiatric disorder: prospective results from the Whitehall II study. Occup Environ Med 1999;56:302-7.

Epilogue

The focus of this thesis was twofold. Firstly, to study characteristics of employees consulting the General Practitioner (GP) or Occupational Physician (OP) in terms of fatigue, (mental) health problems, and psychosocial work characteristics. Secondly, to characterize the working population in terms of fatigue and mental health problems. Following from the first aim, four studies (chapter 2 to 5) focused on employees' help seeking behaviour directed to the GP or OP. Following from the second aim, three studies (chapter 5 to 7) focused on fatigue, mental health problems and their possible determinants in the working population. In the successive discussion sections in chapter 2 to 7, the main results and methodological considerations have already been discussed for each study separately. This epilogue additionally attempts to discuss the main study results and methodological considerations in the light of the relevance for (occupational) health research, general practitioners and occupational physicians.

Health problems, psychosocial work characteristics and help seeking behaviour in the working population

In the general introduction (chapter 1), it was put forward that intertwined associations can be expected between fatigue, mental health problems, chronic conditions and help seeking behaviour in the general population. When focusing on the working population instead of the general population, it was assumed that not only these complex associations also apply the working population, but that associations can also be expected between psychosocial work characteristics, health and help seeking behaviour in the working population. The results of the studies presented in chapter 2 to 5 correspond with these assumptions. Among employees, both indicators of health problems and psychosocial work characteristics were found to be associated to consulting a physician while still at work, either in relation to work (chapter 2 and chapter 3) or in relation to fatigue (chapter 5). It would appear, therefore, that not only indicators of health problems present in employees but also employees' perception of the work environment deserves attention in the (occupational) anamnesis and diagnostic process conducted in employees seeking help while still at work. Furthermore, indicators of health problems and psychosocial work characteristics in employees visiting the GP and/or OP in relation to work were both found to be prospectively associated to incident sickness absence (chapter 4). Hence, in employees seeking help while still at work, not only indicators of health problems but also psychosocial work characteristics might be involved in threatening the work ability of employees, and consequently both deserve attention as possible targets for interventions focusing on the maintenance of employees' work ability.

Resulting from their position in the Dutch health care system, OPs can be expected to have a good insight in the psychosocial work environment of

employees, while GPs can be expected to have a good overview of the medical status of the patient and the social context their patients live in. Regarding the guidance of maintaining employees' ability to function in the workplace, all parties involved (employees, GPs, OPs) are likely to benefit from good communication and cooperation between GPs and OPs. As Dutch employees who become sick have had to deal with both their GPs and OPs since 1998,[1] an increasing amount of studies have focused on the cooperation between these physicians regarding employees experiencing problems in the workplace. These studies indicate that GPs and OPs have a long, intractable and complex record of poor communication and cooperation.[1-5] Following from structured interviews among GPs and OPs, one of the most important obstacles within the troublesome relationship between two types of physicians seems to be that GPs suspect OPs of serving employers more than employees, indicating a need for OPs to clarify their position to GPs.[1] In order to improve the cooperation between GPs and OPs in the Netherlands, several initiatives directed to both physicians have been undertaken to clarify OP's position to GPs.[1,4,5] In terms of the behaviour of employees, the studies presented in chapter 3 to 5 provide information about the direction of help seeking actions of employees in direction of the OP or GP, and about the possible influence of indicators of health problems and psychosocial work characteristics on this direction. Either in terms of visits in relation to work (see chapter 3 and 4) or in terms of unspecified visits (see chapter 5), employees were not more likely to visit only the OP instead of only the GP. Furthermore and rather surprisingly, none of the indicators of health problems and psychosocial work characteristics was found to be uniquely associated to visiting only the OP instead of visiting only the GP in relation to work (see chapter 3). Possibly, these findings suggest that not only GPs, but also employees lack a clear perception about the position of OPs and their possible role in guarding the work ability of the employed population. Within the framework of the Maastricht Cohort Study of Fatigue at Work, it was not possible to elaborate on how the involvement of OPs and GPs with respect to maintaining the work ability was perceived by employees. To elucidate further how employees perceive the position of both physicians, future studies in the working population are recommended to conduct interviews or other type of (qualitative) data analyses among employees.

In the light of interpreting the study results and recommendations for further research, several other issues have to be mentioned. An advantage of focusing on indicators of health problems and psychosocial work characteristics in employees actually visiting the GP or OP, is that this group of employees is relatively accessible to at least one physician for actions potentially benefiting the maintenance of employees' work ability. In light of this, exploring whether it is possible to construct a risk profile to detect employees still active at work but nevertheless particularly at risk for a reduced work ability would be of value for

both GPs and OPs. Regarding an exploration which factors should be included in such a risk profile, it seems an adequate assumption that selecting the group of employees indicating having visited the GP or OP 'in relation to work', enabled us to select problems present in employees experiencing problems in their working situation. For guidance on the level of individual employees, however, physicians will need more individual-specific profiles to be able to identify those factors most likely to threaten an individual employees' work ability. Further studies are necessary to create such a profile. Furthermore, we do not know how homogenous the group of employees indicating having visited the GP or OP in relation to work is in terms of reasons to consult. We had to rely on the employees' opinion whether the physician was visited in relation to work and did not have additional information regarding a more precise reason for encounter, neither from the employee, nor from the physician. Consequently, further research studying whether associations with work and health factors differ between certain subgroups of employees (for example, employees primarily reporting a work-related problem versus employees primarily reporting a health-related problem) and whether the work ability in some of these subgroups might be extra at risk, is necessary. Moreover, as a discrepancy between patients' and physicians' opinions about the interpretation and relevance of fatigue and mental health problems can hinder the detection of and consequently the care of health problems,[6-8] both patients' and physicians' opinions about the reason for encounter and the meaning of the presented complaints can be important in this matter.

Given that the indicators of health problems and psychosocial work characteristics were derived from self-report questionnaires, it should also be noted that we do not know to which extent these indicators of health problems and psychosocial work characteristics were 1) actually perceived as a problem by the employee, 2) were actually reported to the physician as a relevant problem, and 3) were recorded by the physician as a reason for encounter. Therefore, we encourage further help seeking studies in the working population including all three levels of information. From studies in the general population we know that, although the majority of individuals with fatigue and mental health problems are managed in primary care,[9-12] the percentage of fatigue and mental health problems presented to and recorded by the physician probably is just the tip of the iceberg. General practice studies indicated that relatively few patients with indications for fatigue or mental health problems actually present their problem during consultation.[13-17] Furthermore, actually presenting a problem during consultation does not automatically have to result in the physician recording the problem as a reason for encounter. Although employees consulting their GP for fatigue were found to have higher levels of fatigue and more indicators of mental health and psychosocial work problems than employees consulting for other reasons than fatigue (see chapter 5), we were not able to separate employees indicating visiting in relation to

fatigue with fatigue as the chief complaint from employees visiting in relation to fatigue but without fatigue as the chief complaint. However, such a distinction may be of importance in the light of patients' compliance with respect to diagnostic, preventive or treatment actions suggested or undertaken by the physician. The compliance of the patient may especially be at stake when physicians do not record fatigue as a reason for encounter in patients visiting in relation to fatigue, and experiencing fatigue as the chief complaint. In line with this assumption, in health problems characterized as inexplicable, physicians are recommended to focus their communication on the concerns of the patient.[18]

Fatigue and mental health problems in the working population

The employees consulting the GP or OP studied in chapter 2 to 5 originate from the total working population encompassed in the Maastricht Cohort Study on Fatigue at Work. Focusing on both employed populations (visitors of GP/OP and the total working population) in terms of fatigue, (mental) health problems and psychosocial work characteristics may gain further insight in the presence of these problems among employees. Two studies described in this thesis explored mental health problems as possible determinants of fatigue in visitors of the GP or OP (chapter 5) or subsamples taken from the total Maastricht Cohort Study (chapter 6), while one study focused on anxiety and depression and their associations with psychosocial work characteristics (chapter 7) in the total population of the Maastricht Cohort Study.

The study focusing on employees consulting the GP or OP in relation to fatigue provides information about employees' attributions of their fatigue complaints (see chapter 5). Although - because of the cross-sectional character of the study - we cannot rule out that employees' fatigue attributions were influenced by the physician, psychological instead of somatic fatigue attributions were reported by a comparable percentage of GP visitors (44% versus 42%), and even by a higher percentage of OP visitors (74% versus 20%). In line with these results, both psychological and psychosocial attributions were found to be common among individuals feeling fatigued in general practice and community studies.[10,19,20] Furthermore, supporting the recommendation to ask patients themselves for their causal attributions for common somatic symptoms,[7] employees own fatigue attribution seemed to be in line with indicators of health problems present besides and related to fatigue. Consequently, employed patients may also be willing to approach feeling fatigued as a problem which can have different causes, with psychological or psychosocial factors as likely explanations. Hence, asking patients about their own fatigue attributions might help physicians to gain insight in underlying health problems for fatigue.

Another way of characterizing the working population in terms of mental health problems and fatigue was followed in chapter 6. To explore prospective associations between mental health and fatigue, we examined the effect of level of pathological worry as an individual mental health characteristic on level of fatigue ten months later (see chapter 6). In two subsamples of employees with a contrast regarding their fatigue level (originally non/low-fatigue employees versus originally very fatigued employees) a prospective association was found between level of pathological worry and level of fatigue ten months later. However, this prospective association disappeared after adjusting for baseline fatigue level, therefore casting some doubt on an independent prospective effect of pathological worry on fatigue. However, as pathological worry was only examined in two subsamples with a high contrast regarding level of whereas a continuous distribution was found for fatigue in the working population,[21] future studies among employees are recommended to re-examine the possible effect of pathological worry on fatigue in a study population covering the total continuum of possible fatigue scores.

Furthermore, the working population was characterized with respect to the prevalences of anxiety and depression and their associations with work characteristics (chapter 7). This study showed that the short and easy to administer Hospital Anxiety and Depression (HAD) scale seems to enable the measurement of anxiety and depression as separate constructs within the working population. Using the HAD scale, considerable prevalences of subclinical levels of both anxiety (8.2% for males, 10.0% for females) and depression (7.1% for males, 6.2% for females) were found among employees. When using this self-report questionnaire, partial differential associations were found between employees' perception of their work environment and anxiety and depression among employees still active at work. This finding possibly indicate that other psychosocial work characteristics might be involved in the etiology of anxiety than in the etiology of depression. This is important for GPs, OPs and other (health) care professionals, since the role of (psychosocial) work characteristics in the diagnosis, prevention and treatment of anxiety and depression in the working population may be different. Further longitudinal studies are needed to confirm this.

OVERALL CONCLUSION

In conclusion, intertwined and diffuse relationships between fatigue, (mental) health, psychosocial work characteristics and consulting a physician seem to be present in the working population. In the working population, not only indicators of health problems but also the perception of the work environment is likely to be involved in help seeking behaviour and the ability to function.

REFERENCES

1. Buijs P, van Amstel R, van Dijk F. Dutch occupational physicians and general practitioners wish to improve cooperation. Occup Environ Med 1999;56:709-13.
2. Buijs P. Gebrek aan Arbocuratieve afstemming jarenlang herkend maar niet erkend - van verleden tot heden (1): de periode tot begin jaren '90. Tijdschrift voor Bedrijfs- en Verzekeringsgeneeskunde 2001;9:133-8.
3. Buijs PC. Groeiend bestuurlijk draagvlak voor betere Arbocuratieve samenwerking : van verleden tot heden (2) : 1990-1997. Tijdschrift voor Bedrijfs- en Verzekeringsgeneeskunde 2001;9:177-82.
4. Buijs P. Een stroomversnelling van Arbocuratieve initiatieven: Van verleden tot heden (deel 3): 1997-2001. Tijdschrift voor Bedrijfs- en Verzekeringsgeneeskunde 2001;9:206-11.
5. Buijs PC, Weel ANH. Epiloog: Omzien in verwondering, vooruitzien in verwachting. Tijdschrift voor Bedrijfs- en Verzekeringsgeneeskunde 2001;9:253-4.
6. Araya R, Lewis GH, Rojas G, Mann AH. "Patient knows best" - detection of common mental disorders in Santiago, Chile: cross sectional study. BMJ 2001;322.
7. Kessler D, Lloyd K, Lewis G, Gray DP. Cross sectional study of symptom attribution and recognition of depression and anxiety in primary care. BMJ 1999;318:436-40.
8. Stanley I, Salmon P, Peters S. Doctors and social epidemics: the problem of persistent unexplained physical symptoms, including chronic fatigue (Editorial). Br J Gen Pract 2002;5:355-6.
9. Ridsdale L. Tired all the time; most cases are managed in primary care - where the research needs to be done. BMJ 1991;303:1490.
10. Ridsdale L, Evans A, Jerrett W, et al. Patients with fatigue in general practice: a prospective study. BMJ 1993;307:103-6.
11. Kenter EGH, Okkes IM. Prevalentie en behandeling van vermoeide patienten in de huisartspraktijk; gegevens uit het Transitieproject (Patients with fatigue in general practice; prevalence and treatment). Nederlands Tijdschrift voor Geneeskunde 1999;143:796-801.
12. Cape J, Barker C, Buszewicz M, Pistrang N. General Practitioner psychological management of common emotional problems (II): a research agenda for the development of evidence-based practice. Br J Gen Pract 2000;50:396-400.
13. Lewis G, Wessely S. The epidemiology of fatigue: more questions than answers. J Epidemiol Community Health 1992;33:191-8.
14. Cathebras PJ, Robbins JM, Kirmayer LJ, Hayton BC. Fatigue in primary care: prevalence, psychiatric comorbidity,illness behavior and outcome. J Gen Intern Med 1992;7:276-86.
15. Fuhrer R, Wessely S. The epidemiology of fatigue and depression: a French primary-care study. Psychol Med 1995;25:895-905.
16. Verhaak PF, Tijhuis MA. Psychosocial problems in primary care: some results from the Dutch National Study of Morbidity and Interventions in General Practice. Soc Sci Med 1992;35:105-10.
17. Cape J, McCulloch Y. Patients' reasons for not presenting emotional problems in general practice consultations. Br J Gen Pract 1999;49:875-9.

18. Fischhoff B, Wessely S. Managing patients with inexplicable health problems. BMJ 2003;326:595-7.
19. David A, Pelosi A, McDonald E, et al. Tired, weak or in need of rest: fatigue among general practice attenders. BMJ 1990;301:1199-1202.
20. Pawlikowska T, Chalder T, Hirsch SR, et al. Population based study of fatigue and psychological distress. BMJ 1994;308:763-6.
21. Bültmann U, Kant IJ, Kasl SV, Beurskens AJHM, van den Brandt PA. Fatigue and psychological distress in the working population: psychometrics, prevalence and correlates. J Psychosom Res 2002;52:445-52.

Summary

In the general introduction (*chapter 1*), the rationale of the thesis, study aims and study framework are described. Focusing on employees with an active working status (thus not absent from work) but nevertheless experiencing problems in the working situation, can provide valuable insights in terms of developing measures that may help to guard employees' work ability and to prevent that demands of the work cannot be met anymore. Within the Dutch (occupational) health care system, both GPs and OPs can have a role in guarding the work ability of their consulting employed patients, and in detecting problems that may be important to take into account in this group of employees.

Fatigue with a prolonged character (from now on referred to as fatigue) and mental health problems have both been found to be prevalent in the general and working population, and to be associated to a reduced work ability. However, these health problems have as yet not been examined in association to visiting the GP or OP in employees still active at work. Consequently, it is as yet not clear whether focusing on these types of health problems in this subpopulation is useful for GPs and/or OPs in terms of guarding employees' work ability. Whereas fatigue and mental health problems can both be present as a symptom of chronic somatic conditions and associations have been found between fatigue, mental health and psychosocial work characteristics, interrelationships between health problems, psychosocial work characteristics, and consulting a physician may also be present. Taken together, these findings resulted in two central aims. The first aim of the thesis was to focus on characteristics of employees consulting the GP or OP in terms of fatigue, mental health problems, chronic somatic conditions, and psychosocial work characteristics. The second aim zoomed in on characterizing the working population in terms of fatigue and mental health problems.

All studies presented in this thesis were conducted within the framework of the Maastricht Cohort Study on Fatigue at Work, a large-scale epidemiological prospective cohort study consisting of a heterogeneous population of 12,140 employees at baseline (May 1998). With a four-monthly interval, self-report questionnaires, incorporating a broad range of work-related, health-related, and individual characteristics, were sent to the cohort participants.

As little is known about help seeking behaviour directed to the GP in the working population, the explorative study in *chapter 2* examined how fatigue, mental health problems, chronic somatic conditions, and psychosocial work characteristics were associated to consulting a GP in relation to work in the entire baseline population of the Maastricht Cohort Study. In total, 12,029 employees indicated whether they

did or did not visit the GP in relation to their work during the past four months, of which 14.9% indicated such a visit. Measurements of health problems consisted of level of fatigue (as measured with the Checklist Individual Strength, the CIS), presence of at least one chronic condition with a somatic character or with somatic elements (from now on referred to as chronic conditions), and level of likelihood of having mental health problems (as measured with the 12-item General Health Questionnaire, the GHQ-12). The Job Content Questionnaire (JCQ) was used to measure the psychosocial work characteristics psychological job demands, decision latitude, and social support at work. In comparison to employees not having visited the GP in relation to work, morre indicators of health problems and a more negative perception of their psychosocial work environment were present in employees having visited the GP in relation to work. The results of multiple logistic regression analyses indicate that, although interrelationships should be taken into account, both health problems (Odds Ratios varying between 1.87 and 2.50) and psychosocial work characteristics (Odds Ratios varying between 1.25 and 1.46) were independently associated to visiting a GP in relation to work. Consequently, GPs taking care of the health of employees consulting in relation to work can also benefit from insight in the psychosocial work characteristics of these employees.

In the study described in *chapter 3*, it was examined whether health problems and psychosocial work characteristics were independently prospectively associated to consulting only the GP or only the OP in relation to work in a time span of four to eight months later, taking into account interrelations between health problems and psychosocial work characteristics. Contrary to the cross-sectional study (see chapter 2), only employees active at work were included in this prospective study. Of these employees active at work, 4.6% indicated having visited only the GP, while 3.8% indicated having visited only the OP. In addition to the measurements included in chapter 2, (psychosocial) work characteristics also included physical and emotional demands at work, and the presence of a work-family conflict. The results of multiple logistic regression analyses show that all indicators of health problems (Odds Ratios varying between 1.31 and 1.80) and some of the psychosocial work characteristics (emotional demands, physical demands, presence of a work-family conflict; Odds Ratios varying between 1.36 and 1.95) were independently associated to consulting a physician in relation to work. Regarding the direction of the help seeking behaviour, consulting only the GP instead of only the OP in relation to work was preceded by work-related problems representing emotional demands or a work-family conflict, representing work-related factors possibly relatively difficulty to objectify for both patients and physicians.

Whereas several studies in the working population identified both health problems and psychosocial work characteristics as predictors of long term sickness absence,

studies focusing on risk factors of sickness absence have as yet not been conducted specifically among employees who visited the GP or OP in relation to work before sickness absence was present. As this group of patients is easily accessible for GPs or OPs in terms of preventive measures, the study in *chapter 4* focused on risk factors of long-term sickness absence in this group of visitors. With one additional work-related measurement (job satisfaction), indicators of health problems and psychosocial work characteristics were equal to those investigated in the cross-sectional study (see chapter 2). Company offices and occupational health services provided information regarding the total number of sickness absence days of the study population during an 18-month period. In multiple logistic regression analyses, both indicators of health problems (especially presence of at least one chronic somatic condition; Odds Ratio 2.36, 95% Confidence Interval 1.29-4.29) and psychosocial work characteristics (especially a lower level of decision latitude; Odds Ratio 0.59; 95% Confidence Interval 0.42-0.82) were found to be associated to subsequent sickness absence of at least one month, which indicates that both GPs and OPs might play a role in the detection of employees at risk for long term sickness absence.

As indicated in chapter 1, fatigue as a health problem in the working population can be intertwined with a broad range of other health-related and work-related factors, including chronic conditions, mental health problems, and psychosocial work characteristics. Among a population of employees active at work and indicating having visited the GP or OP in the previous six months, the focus of *chapter 5* was on which percentage of these visits were fatigue related, and on how employees' fatigue attributions (psychological, somatic, or 'don't know') in the fatigue related visits were associated to indicators of health problems and psychosocial work characteristics. A distinctly higher proportion of employees active at work indicated having consulted their GP instead of their OP (35.0% versus 3.0%). In these employees, the percentage of consulting employees in which the visit was fatigue related was found to be more than twice as high in OP visitors than in GP visitors (29.0% versus 13.0%) Furthermore, psychological attributions were more common than somatic fatigue attributions in the fatigue related visits to the OP (73% versus 20%), while psychological fatigue attributions were as common as somatic attributions in the fatigue related visits to the GP (44.0% versus 41.8%). Due to the small number of OP visitors, associating these findings to the presence of health problems and psychosocial work characteristics was only possible for visitors of the GP. Within this group, results from chi-square tests and ANOVA analyses indicated that making a fatigue related visit was not only associated to a higher level of fatigue, but also to the presence of more indicators of health-related problems, and a more negative perception of the psychosocial work environment. In employees making a fatigue related visit, a multinomial logistic regression analysis indicated that associations were found between type of

fatigue attributions (psychological, somatic) and type of health problems, but not between type of fatigue attributions and psychosocial work characteristics. The results suggest that asking employed patients about their own fatigue attributions may be helpful for GPs – and possibly also OPs – to get insight in underlying health problems for fatigue.

To get more insight in associations between mental health problems and fatigue in the working population, pathological worrying - representing chronic, uncontrollable worry as an individual characteristic related to pathological mood states such as anxiety and depression – was examined as a determinant of fatigue in *chapter 6*. As the regular cohort questionnaires did not contain information about level of pathological worrying, an additional questionnaire containing a self-report pathological worrying measurement (the Penn State Worry Questionnaire, PSWQ) was sent to two subsamples of the Maastricht Cohort Study that contrasted regarding their level of fatigue (n=400 each). The non/low-fatigued subsample consisted of employees without fatigue or a very low fatigue level (n=349), while the very fatigued subsample (n=343) consisted of employees with a very high fatigue level. Within these subsamples, cross-sectional and longitudinal associations between pathological worry and fatigue were studied. The results from a principal components analysis indicated that in each separate subsample, the PSWQ and CIS enabled the measurement of pathological worry and fatigue as different constructs. Although pathological worry and fatigue could be separated from each other, chi-square analyses indicated that they were also found to be associated on a cross-sectional level. Results of multiple linear regression analyses indicated that in both subsamples separately, level of pathological worry was positively associated to level of fatigue ten months later. Regression to the mean is likely to have diluted this association in the non/low-fatigued group, but not in the very fatigued group. The results also indicated that stronger prospective associations were present between level of fatigue and level of fatigue ten months later than between level of pathological worrying and level of fatigue ten months later. In both subsamples, the longitudinal association between pathological worrying and fatigue disappeared after adjustment for the cross-sectional association between pathological worrying and fatigue. Together with the recommendation to examine whether these findings can be replicated in a more normally distributed population regarding level of fatigue, studying pathological worrying as a mediating variable instead of a direct risk factor might provide further information relevant for the identification of possible preventive or therapeutic measures for fatigue in the working population.

Focusing on anxiety and depression as mental health problems in the working population, prevalences of anxiety and depressive symptoms on different severity levels, and differential associations between psychosocial work characteristics and anxiety and depression in the working population were examined in *chapter 7*. As a

general category, mental health problems have repeatedly been identified as being associated to a substantial degree of work impairment. Although depressive and anxiety disorders represent two categories of psychiatric disorders on a clinical level that can be differentiated regarding recommended diagnostic instruments and methods of treatment, only a minority of studies in the working population used instruments enabling investigating whether anxiety and depression can be separated as two separate constructs in the working population, and whether determinants for both categories of mental health problems may differ. Instead of a general mental health questionnaire, the Hospital Anxiety and Depression (HAD) scale was used, a questionnaire measuring different severity levels of anxiety and depression in two separate subscales. Measurements of psychosocial work characteristics as possible determinants of anxiety or depression consisted of psychological job demands, decision latitude, social support, emotional demands, conflict with supervisor or co-workers, job insecurity, and job satisfaction. The results of an explorative principal components analysis indicated that the HADS enables the measurement of anxiety and depression as different constructs in the working population. For both anxiety and depression, the prevalence in the working population of anxiety or depressive problems likely to be (sub)clinically relevant was considerable (8.2% and 7.1% for males respectively, and 10.0% and 6.2% for females, respectively). Partial different associations were found to be present for psychosocial work characteristics in relation to anxiety and depression, supporting the usefulness of distinguishing anxiety from depression in the working population. In the light of possible reduction of the risk or even prevention of anxiety or depression in the working population, the diagnosing, prevention or management of anxiety and depression may require focusing on different aspects of the work environment.

Following from the aims of this thesis as described in chapter 1 and in addition to the discussion sections in chapter 2 to 7, the epilogue in *chapter 8* focuses on the relevance of study results for (occupational) health care, general practitioners and occupational physicians. It is concluded that in the working population, intertwined associations between fatigue, (mental) health problems, and psychosocial work characteristics can have an effect on consulting a physician and a diminished ability of employees to function in the workplace. In guarding the work ability of employees still active at work, both GPs and OPs are encouraged to take into account not only indicators of health problems, but employees' perception of the work environment as well.

Samenvatting

Vermoeidheid en psychische problemen komen veel voor in de werkende populatie en hangen beiden samen met een verminderd werkvermogen van werknemers in de vorm van ziekteverzuim en arbeidsongeschiktheid. In het Nederlandse gezondheidszorgsysteem hebben zowel de huisarts als de bedrijfarts een taak in het bewaken van de gezondheid van de werkende patiënten door wie ze geconsulteerd worden. Alhoewel bekend is dat in een aanzienlijk percentage van huisarts- en bedrijfsartspatiënten er sprake is van klachten op het gebied van vermoeidheid en/of psychische problematiek, is nog niet onderzocht tot in hoeverre vermoeidheid en psychische problematiek bij werkende patiënten gerelateerd is aan het bezoeken van de huisarts en bedrijfsarts. Hierdoor is nog niet bekend of het in - het kader van het bijstaan van werkenden om te kunnen blijven functioneren in de arbeidssituatie - zin heeft dat huisartsen en bedrijfsartsen aandacht schenken aan vermoeidheids- en psychische klachten bij werkenden die hen bezoeken. Om dit nader te bestuderen, richten de studies in dit proefschrift zich op vermoeidheid en psychische klachten in de werkende populatie, en op verbanden met het bezoeken van de huisarts en bedrijfsarts door werkenden.

Zowel vermoeidheid als psychische problemen hoeven niet op zichzelf te staan als gezondheidsproblemen, maar kunnen zich ook manifesteren als symptomen van chronische somatische aandoeningen. Studies onder werkenden wijzen daarnaast op verbanden tussen vermoeidheid, psychische problemen en psychosociale werkgebonden factoren als werkdruk, controle over het werk en sociale steun op het werk. Om deze redenen wordt in de studies in dit proefschrift ook rekening gehouden met de aanwezigheid van chronische somatische aandoeningen bij werknemers en met de psychosociale werkomgeving van de werkenden. Dit proefschrift heeft twee centrale doelen. Het eerste doel was om te focussen op kenmerken van werknemers die de huisarts en/of bedrijfsarts bezoeken in termen van vermoeidheid, psychische klachten, chronisch somatische aandoeningen, en psychosociale werkgerelateerde factoren. Het tweede doel was een verdere uitdieping van de kenmerken van werkenden in termen van vermoeidheid en psychische problemen. Deze doelstellingen en de inbedding ervan worden beschreven in *hoofdstuk 1* van dit proefschrift.

Alle studies die in dit proefschrift gepresenteerd worden zijn uitgevoerd binnen het kader van de Maastrichtse Cohort Studie naar Psychische Vermoeidheid in de Arbeidssituatie (PVA), een grootschalige epidemiologische cohort studie bestaande uit een heterogene populatie van 12,140 werknemers (verdeeld over 45 bedrijven) bij de start van het onderzoek (Mei 1998). Iedere vier maanden werd de cohortdeelnemers gevraagd om zelf vragenlijsten in te vullen. De schriftelijke

vragen besloegen tezamen een brede range van werkgerelateerde, gezondheidsgerelateerde en individuele karakteristieken.

Er is nog maar weinig bekend over het hulpzoekend gedrag van werkenden richting huisarts. In de exploratieve studie in *hoofdstuk 2* wordt beschreven hoe indicatoren van gezondheidsproblemen en psychosociale werkkarakteristieken gerelateerd zijn aan het bezoeken van de huisarts in verband met werk in de baseline populatie van de Maastrichtse Cohort Studie. In totaal hadden 12.029 cohort deelnemers de vraag beantwoord die aangeeft of ze al dan niet de huisarts bezocht hebben in de afgelopen vier maanden. Van hen had ongeveer 1 op de 7 (14.9%) een dergelijk bezoek afgelegd. Gezondheidsproblemen die gemeten werden betroffen vermoeidheid (zoals gemeten met de vragenlijst CIS, de Checklist Individuele Spankracht), het aanwezig zijn van minstens één chronische aandoening met een somatisch karakter of met somatische elementen (vanaf nu aangeduid als een chronische aandoening), en de waarschijnlijkheid van het aanwezig zijn van psychische problematiek (zoals gemeten met de GHQ-12, de 12-item General Health Questionnaire). De Job Content Questionnaire (JCQ) werd gebruikt om de psychosociale werkkenmerken werkdruk, besluitmogelijkheden en sociale steun op het werk te meten. Het bleek dat, in vergelijking met werknemers die aangegeven hadden de afgelopen vier maanden niet de huisarts in verband met werk bezocht te hebben, werknemers die wel de huisarts in verband met werk bezocht hebben meer indicatoren van gezondheidsproblemen en een negatievere perceptie van hun psychosociale werkomgeving rapporteerden. De resultaten van een multipele logistische regressie-analyse wezen erop dat (alhoewel er rekening gehouden dient te worden met associaties tussen gezondheidsproblemen en psychosociale werkgerelateerde factoren) zowel de gezondheidsproblemen (Odds Ratios variërend van 1.87 tot 2.50) als de psychosociale werkgebonden factoren (Odds Ratios variërend van 1.25 tot 1.46) onafhankelijk van elkaar gerelateerd waren aan het bezoeken van de huisarts in verband met werk. Deze resultaten wijzen er mogelijk op dat huisartsen die de gezondheid willen bewaken van werkende patiënten die consulteren in verband met werk, er goed aan doen ook de psychosociale werkomgeving van de werkende in ogenschouw te nemen.

In de studie in *hoofdstuk 3* is beschreven tot in hoeverre eerdergenoemde gezondheidsproblemen (vermoeidheid, psychische klachten, chronische aandoeningen) en psychosociale werkkenmerken onafhankelijk van elkaar prospectief gerelateerd zijn aan het vier tot acht maanden later consulteren van de huisarts of bedrijfsarts in relatie met werk. Hierbij werd rekening gehouden met associaties tussen de gezondheidsproblemen en psychosociale werkkenmerken. In tegenstelling tot de cross-sectionele studie in hoofdstuk 2, bestond de onderzoekspopulatie van deze prospectieve studie alleen uit werknemers die ook daadwerkelijk aan het werk waren, dus de werknemers die bij het begin van het

onderzoek niet actief aan het werk waren werden buiten beschouwing gelaten. Van deze actief werkenden gaf 4.6% aan alleen de huisarts bezocht te hebben in verband met werk, en 3.8% rapporteerde alleen de bedrijfsarts bezocht te hebben in verband met werk. Bovenop de gezondheidsvariabelen en psychosociale werkkenmerken die gemeten werden in de studie beschreven in hoofdstuk 2, werden bij deze studie ook de (psychosociale) werkkenmerken lichamelijke en emotionele werkeisen en het al dan niet aanwezig zijn van een werk-thuis conflict gemeten. De resultaten van multipele logistische regressie analyses wijzen erop dat alle indicatoren van gezondheidsproblemen (Odds Ratios varierend van 1.31 tot 1.80) en enkele van de (psychosociale) werkkenmerken (emotionele taakeisen, fysieke taakeisen, aanwezigheid werk-thuis conflict; Odd Ratios varierend van 1.36 tot 1.95) onafhankelijk van elkaar geassocieerd waren met het later bezoeken van een huisarts of bedrijfsarts in relatie met werk. Betreffende de richting van het hulpzoekend gedrag stond alleen het consulteren van de huisarts in relatie met de werkgerelateerde problemen emotionele taakeisen en de aanwezigheid van een werk-thuis conflict. Deze resultaten duiden er mogelijk op dat patiënten met werkgerelateerde problemen die wat moeilijker te objectiveren zijn, de voorkeur geven aan het bezoeken van de huisarts boven het bezoeken van de bedrijfsarts.

Ziekteverzuim in het algemeen en langdurig verzuim in het bijzonder heeft vaak negatieve consequenties voor zowel werknemers als werkgevers. In diverse studies zijn zowel gezondheidsproblemen als psychosociale werkkenmerken geïdentificeerd als voorspellers van ziekteverzuim, wat ze interessant maakt als mogelijke aanknopingspunten voor preventieve maatregelen. Studies over voorspellers van ziekteverzuim zijn echter nog niet specifiek uitgevoerd onder werknemers die de huisarts of bedrijfsarts al bezocht hebben vóórdat er sprake was van verzuim. Aangezien deze werknemers echter wel een groep van werkenden beslaat die relatief makkelijk bereikbaar is voor de huisarts of bedrijfsarts, heeft de studie in *hoofdstuk 4* zich gericht op gezondheidsvariabelen en psychosociale werkkenmerken als risico factoren voor ziekteverzuim onder deze groep werkenden. Met de toevoeging van één werk-gerelateerde werkvariabele (mate van tevredenheid met de baan), werden dezelfde indicatoren van gezondheidsvariablen en psychosociale werkkenmerken gemeten als in de cross-sectionele studie in hoofdstuk 2. De verzuimgegevens van de werkenden werden aangeleverd via de bedrijven en arbodiensten van de cohortdeelnemers in de vorm van totaal aantal ziektedagen over een periode van 1.5 jaar. De resultaten van multipele logistische regressie analyses lieten zien dat zowel de indicatoren van gezondheidsproblemen (vooral chronische aandoeningen; Odds Ratio 2.36, met een interval van 1.29 tot 4.29) als psychosociale werkgerelateerde kenmerken (vooral een mindere mate van besluitmogelijkheden op het werk; Odds Ratio 1.69, met een interval van 1.22 tot 2.38) gerelateerd waren aan later optredend ziekteverzuim met een duur van een maand of langer. Deze resultaten duiden erop dat zowel de huisarts als bedrijfsarts

een rol kunnen spelen bij het detecteren van werknemers die mogelijk risico lopen op langdurig verzuim en het voorkómen van dit verzuim.

In hoofdstuk 1 is reeds aangegeven dat vermoeidheid in de werkende populatie een gezondheidsprobleem is dat gerelateerd kan zijn aan een brede waaier van andere gezondheidsgerelateerde en werkgerelateerde factoren, waaronder chronische aandoeningen, psychische problemen, en psychosociale werkkenmerken. Vanuit een populatie van werknemers die een actieve werkstatus hadden en aangegeven hadden de huisarts of bedrijfsarts bezocht te hebben in de afgelopen zes maanden, werd in de studie in *hoofdstuk 5* bestudeerd welk percentage van die artsbezoeken gerelateerd was aan vermoeidheid, en hoe de eigen verklaringen (attributies) van werknemers van hun vermoeidheid (psychisch, somatisch of 'weet niet') samenhingen met de mate van vermoeidheid en met psychosociale werkkenmerken. Het bleek dat een aanzienlijk hoger percentage van actief werkenden aangaf de huisarts in plaats van de bedrijfsarts bezocht te hebben (35.0% versus 3.0%). Van deze bezoekers was het percentage dat aangaf dat het bezoek vermoeidheidsgerelateerd was, echter twee keer zo hoog bij de bedrijfsarts- dan bij de huisartsbezoekers (29.0% versus 13.0%). Bij de bedrijfsartsbezoekers rapporteerde de meerderheid van de werkenden een psychische attributie als verklaring voor hun vermoeidheid (73.0%), terwijl bij de huisartsbezoekers het percentage psychologische attributies vergelijkbaar was met het percentage somatische attributies (44.0% versus 41.8%). Doordat maar weinig werkenden de bedrijfsarts bezocht hadden, was het alleen voor de huisartsbezoekers mogelijk hun vermoeidheids-attributies te relateren aan de gezondheids- en werkgerelateerde variabelen. Resultaten van chi-square testen en ANOVA analyses bij deze groep werkenden lieten zien dat het afleggen van een vermoeidheidgerelateerd bezoek aan de huisarts niet alleen gerelateerd was aan een hoger niveau van vermoeidheid, maar ook aan het aanwezig zijn van meer indicatoren van gezondheidsgerelateerde problemen, en aan een negatievere perceptie van de psychosociale werkomgeving. Bij de werkenden die de huisarts bezocht hadden in verband met vermoeidheid, gaf een multinomiale logistische regressie analyse aan dat er een verband aanwezig was tussen type vermoeidheid-attributie (psychisch, somatisch) enerzijds en type gezondheidsprobleem anderzijds, maar niet tussen type vermoeidheid-attributie en psychosociale werkkenmerken. Bij elkaar genomen suggereren de resultaten van deze studie dat het voor de huisarts – en mogelijk ook voor de bedrijfsarts – bij de ondersteuning en behandeling van werkende patienten die consulteren in verband met vermoeidheid behulpzaam kan zijn om de patient te vragen naar zijn/haar eigen verklaringen voor vermoeidheid, aangezien deze verklaringen in deze studie redelijk adequaat lijken te zijn.

Om meer inzicht te verkrijgen in relaties tussen psychische klachten en vermoeidheid in de werkende populatie, is in de studie in *hoofdstuk 6* aandacht besteed aan pathologisch piekeren als een voorspeller van vermoeidheid. Met chronisch piekeren wordt hier gedoeld op een individueel kenmerk dat gerelateerd is aan zowel angst als depressie, namelijk het zich chronisch en onophoudelijk zorgen maken. Aangezien de reguliere cohortvragenlijsten geen informatie over chronisch piekeren bevatten, hebben twee subgroepen (ieder n=400) van de Maastrichtse Cohort Studie als extra vragenlijst de PSWQ (Penn State Worry Questionnaire) ontvangen. De ene subgroep (PSWQ ontvangen van n=349) bestond uit cohortdeelnemers die geen of een zeer laag niveau van vermoeidheid rapporteerden, terwijl de andere subgroep (PSWQ ontvangen van n=343) aangaf juist zeer vermoeid te zijn. Binnen deze subsamples werd zowel de cross-sectionele als de longitudinale relatie tussen pathologisch piekeren en vermoeidheid bestudeerd. Uit de resultaten van een factor-analyse volgde dat het met de PSWQ en de CIS mogelijk is pathologisch piekeren en vermoeidheid als twee onafhankelijke constructen te meten. Hoewel pathologisch piekeren en vermoeidheid aldus van elkaar gescheiden konden worden, duidden chi-square analyses erop dat beide verschijnselen op een cross-sectioneel niveau ook geassocieerd waren. Uit prospectieve multipele lineaire regressie-analyses kwam naar voren dat een hoger niveau van pathologisch piekeren samenging met een hoger niveau van vermoeidheid tien maanden later. In de niet/laag-vermoeide subgroep kan regressie naar het gemiddelde effect hebben gehad op deze resultaten, bij de zeer vermoeide subgroep is dit echter niet waarschijnlijk. Wel lieten de longitudinale resultaten ook duidelijk zien dat een sterkere positieve associatie aanwezig was tussen vermoeidheid bij aanvang en vermoeidheid tien maanden later, dan tussen pathologisch piekeren en vermoeidheid tien maanden later. In beide subgroepen verdween de longitudinale relatie tussen pathologisch piekeren en vermoeidheid na correctie voor de cross-sectionele relatie tussen pathologisch piekeren en vermoeidheid. Samen met de aanbeveling om niveaus van pathologisch piekeren en vermoeidheid met elkaar te vergelijken in een normaal verdeelde populatie in plaats van alleen in twee contrasterende subgroepen, is het wellicht zinvol pathologisch piekeren niet alleen als een directe risicofactor voor vermoeidheid te onderzoeken, maar ook als een mediërende variabele.

De studie in *hoofdstuk 7* richtte zich op het bestuderen van angst en depressie als vertegenwoordigers van psychische problemen in de werkende populatie en op het vóórkomen (de prevalenties) van angst- en depressieve symptomen onder werkenden. Daarnaast is nagegeaan of psychosociale werkkenmerken een andere relatie hebben met angst dan met depressie. Als een algemene categorie van psychische gezondheidsproblemen is al herhaaldelijk aangetoond dat zowel angst als depressie samen kunnen gaan met een verminderd werkvermogen. Alhoewel

angst en depressie op klinisch niveau onderscheiden worden als twee verschillende diagnostische categorieën met verschillende behandelmethoden, zijn er nog maar weinig studies geweest waarin nagegaan is of in de werkende populatie angst en depressie van elkaar te onderscheiden zijn, en waarin bekeken is of angst en depressie op een verschillende manier met (psychosociale) werkgerelateerde factoren geassocieerd zijn. Om deze punten nader te bekijken, is in deze studie geen gebruik gemaakt van een algemene vragenlijst voor psychisch welbevinden, maar van een vragenlijst die angst en depressie meet middels twee aparte subschalen, de HAD (Hospital Anxiety and Depression) Schaal. Psychosociale werkkenmerken als mogelijke determinanten voor angst of depressie werden gemeten in de vorm van werkdruk, besluitmogelijkheden op het werk, sociale steun op het werk, emotionele taakeisen, conflict met leidinggevende of collega's, werkonzekerheid en tevredenheid met baan. De resultaten van een exploratieve factoranalyse gaven aan dat de HAD Schaal het mogelijk maakt in de werkende populatie angst en depressie onafhankelijk van elkaar te meten. Zowel angst als depressie lijken op een (sub)klinisch niveau bij een aanzienlijk deel van de actief werkende populatie voor te komen, met prevalenties van 8.2% en 7.1% respectievelijk voor mannen en prevalenties van 10.2% en 6.2% respectievelijk voor vrouwen. Verder werd gevonden dat psychosociale werkkenmerken gedeeltelijk een unieke relatie met angst hebben, gedeeltelijk een unieke relatie met depressie, en gedeeltelijk een relatie met beide categorieën van psychische problemen. Samengenomen ondersteunen de resultaten van deze studie het onderscheiden van angst van depressie in de werkende populatie. In het licht van het terugbrengen of zelfs voorkómen van angst of depressie in de werkende populatie, is het wellicht zinvol bij het diagnosticeren, onder controle brengen of behandelen van angst en depressie rekening te houden met verschillende aspecten van de psychosociale werkomgeving.

Volgend uit de doelstellingen van dit proefschrift zoals beschreven in hoofdstuk 1 en aansluitend op de discussie-paragrafen in hoofdstuk 2 tot en met 7, gaat de epiloog in *hoofdstuk 8* nader in op de relevantie van de studie-resultaten voor de (bedrijfs)gezondheidszorg, huisartsen en bedrijfsartsen. Geconcludeerd wordt dat een complex samenspel van onderlinge verbanden aanwezig lijkt te zijn tussen vermoeidheid, psychische problemen, chronische aandoeningen en psychosociale werkkenmerken, en dat dit samenspel van invloed is op het bezoeken van een arts en het optreden van een verminderd werkvermogen in de werkende populatie. Bij het bewaken van het werkvermogen van actief werkenden, ondersteunen de resultaten van dit proefschrift dat zowel huisartsen als bedrijfsartsen niet alleen letten op indicatoren voor gezondheidsproblemen, maar ook op hoe de werkende patiënt zijn/haar psychosociale werkomgeving ervaart.

Dankwoord

Vele handen hebben het werken aan dit proefschrift aanzienlijk lichter gemaakt. Graag wil ik een aantal personen hier met naam noemen en bedanken.

Gedurende het hele project stond er een betrokken en multidisciplinaire projectgroep tot mijn beschikking. In het begin vond ik het zelfs behoorlijk overdonderend met zo'n bataljon van 'wijze mensen' aan tafel te zitten! Allereerst mijn dank aan Sandra Beurskens. Sandra, jouw deur stond altijd open, niet alleen voor overleg en snelle feedback op mijn 'geschriften' (wel wint de komma het doorgaans nog steeds van de punt, ben ik bang...), maar ook voor van alles 'des onderzoeks' en 'des levens'. Zelfs nadat je elders bent gaan werken, ben je bij mijn onderzoek betrokken gebleven. Dit waardeer ik zeer. Ook IJmert Kant was een belangrijke 'rots in de branding'. IJmert, jij hebt met verve de dagelijkse begeleiding op je genomen tijdens de laatste twee jaar van het project. Hoe hoog ook de stapels op je bureau en hoe vol ook je agenda, er was altijd wel ruimte voor overleg. Ook jouw enthousiasme, onderzoekskennis en relativeringsvermogen ("as is verbrande turf...") zijn het onderzoek zeker ten goede gekomen. Onno van Schayck en Job Metsemakers hebben tevens een belangrijke bijdrage aan het onderzoek geleverd en waren altijd bereikbaar voor commentaar, ook als het 'haastklussen' betrof. Onno, ik heb je ervaren als een betrokken eerste promotor. Onze discussies over de rode draad van het onderzoek waren erg bruikbaar, vooral als ik 'm even kwijt was! Ook stel ik het op prijs dat je me de ruimte hebt gegeven meer 'mental health' accenten in het onderzoek aan te brengen. Job, zowel vanuit je wetenschappelijke kennis en kritische blik, als vanuit je praktijkervaring als huisarts kon ik met vele vragen en twijfels bij je terecht. Ludovic van Amelsvoort vervulde tevens een waardevolle rol binnen de projectgroep. Ludo, je was altijd beschikbaar voor advies, ook voor de meest basale statistiek vragen. Bedankt daarvoor!

Ook binnen de Maastrichtse Cohort Studie als groter geheel hebben verschillende mensen eraan bijgedragen dat dit boekje hier nu ligt. Allereerst natuurlijk de werknemers die bereid waren al die vragenlijsten in te (blijven) vullen. Ook angst- en depressievragen – toch niet de 'leukste' onderwerpen om over na te denken – schrokken jullie niet erg af.
Het organisatorische en logistieke hart van de cohort studie bevond zich op de capgroep Epidemiologie. Doordat daar al heel veel werk was verzet op het moment dat ik met het project begon, stond er al een solide trein om in te stappen op de rails. Jos Slangen, dankzij jouw dataverwerking, databeheer en bereidheid nog maar eens uit te leggen hoe de dataset (en SPSS!) in elkaar zat, bleven zelfs bestanden met honderden variabelen en duizenden werknemers overzichtelijk. Ute Bültmann, Nicole Jansen en Danielle Mohren, als (voormalig) "Epi-PVAio's"

hebben jullie veel werk verzet voor de cohortstudie als geheel. Daarbij was het fijn om bij tijd en wijle "PVAio"-vreugde en –leed te kunnen delen. Ook Piet van den Brandt, Gerard Swaen, Marcus Huibers en Helma van der Heuvel dank ik voor de betrokkenheid bij het project.

Prof. Graham Davey, Dr. Andy Field, and Dr. Helen Startup, thanks to you I felt (again) very welcome during my work visit to the University of Sussex. Graham and Helen, thank you very much for your advice regarding the pathological worry research. Andy, thank you very much for also finding the time to discuss my research project during your stay in Maastricht, and for your invaluable statistical advice (and you'll probably still thank me for the "warm" canoe trip, I guess…..).

Prof. André Knottnerus bedank ik voor zijn rol als voorzitter van de beoordelingscommissie en prof. Frans Nijhuis, prof. Frank van Dijk, prof. Gijs Bleijenberg en dr. Ab Landeweerd voor het beoordelen van het manuscript.

Ondanks dat ik door mijn gependel tussen Roosendaal en Maastricht er lang niet altijd was, is de capgroep Huisartsgeneeskunde in de loop van de tijd steeds meer als mijn onderzoeksthuisbasis gaan voelen, niet in de laatste plaats door de steun en belangstelling van de vakgroepcollega's, waarvoor allen dank! Ik denk hierbij met name aan de "three degrees" Anne-Marie Korsten (ook dank voor de hand- en spandiensten op secretarieel gebied!), Babette Doorn en Annie Hendriks (voor de gezellige etentjes en de exotische en altijd leerzame filmkeuzes), aan Silvia Bours (kamergenoot en vroege vogel), aan Vinca Linssen (fietsmaatje vanuit 'helemaal' de Heeg), Lisette van der Bemt (mede-Brabo, maar behoorlijk meer carnaval-minded...) en ook aan Judith Sieben, Mark Spigt, Rogier Hopstaken, Saskia Mol en de andere "derde verdiepinggenoten". Van de "niet-wetenschappelijke" collega's (zonder jullie zijn "wij wetenschappers" nergens!) wil ik verder met name bedanken Ine Siegelaer, Judith Janssen, Ellen Breevoort, Erie van der Heuvel, Marga van der Aa, Jim Tatipata en Lindy Dullens. Ook mijn huidige collega's van de afdeling Onderzoek en Academisering van De Viersprong dank ik hartelijk voor hun belangstelling en hun begrip als mijn aandacht nog maar weer eens naar de afronding van het Maastrichtse onderzoek uitging.

Lieve paranimfen, ik vind het heel geruststellend op 'de grote dag' twee van die kanjers achter me te hebben staan, die tevens beiden weten hoe het is in het "promotieonderzoek-schuitje" te zitten. Karin, onze vriendschap gaat al heel wat jaartjes terug en voor lief en leed op werkgebied en alle andere gebieden kan ik altijd bij je terecht. Inmiddels komen voor jou de laatste lood'jes' ookal in zicht. Ik ben er in ieder geval van overtuigd dat je aan het einde van de rit zowel een goede arts als wetenschapper zult zijn. Nathalie, als om de hoek wonende mede-PVAio was het bij tijd en wijle goed reflecteren op allerlei PVA- en andere zaken, maar

ook gezellig samen eten en theeleuten! Ook voor jou is inmiddels de eindfase van je onderzoek aangebroken, ik heb in ieder geval vertrouwen in de goede afloop ervan.
Beste meiden van de (toen nog) commissie Beroep en Werk van de VBGGK, dankzij jullie ben ik me altijd GGK-er blijven voelen! Ik vond het leuk door mijn werk voor de commissie ook tijdens mijn aio-schap nog bij de studie betrokken te blijven. Heel veel succes met de beroepsvereniging!

Lieve vrienden, ouders, broers en overige familie, ondanks dat het jullie niet altijd duidelijk was wat nou toch maakte dat ik wéér Maastricht opzocht als (part-time) woonplaats en werkplek, hartelijk dank voor de door jullie getoonde belangstelling in mijn onderzoeksvorderingen. Roelof, door jou werd op zeer creatieve wijze mijn laptob weer laptop en Martijn, ook jij bood regelmatig o zo belangrijke computer hard- en software ondersteuning. Hannelore Engels, in korte tijd heb je geweldig veel lay-out werk verricht, waar ik je zeer erkentelijk voor ben. Hetzelfde geldt voor Emiel van der Logt, maar dan ten aanzien van voor- en achterkant van dit boekwerk en de 'kubische inbreng' in het binnenwerk.
Lieve Eric, jouw vertrouwen in mij, je geduld en begrip hebben me door menig moeilijk moment gesleept. Bij jou ben ik thuis en ik heb er dan ook bijzonder veel zin in begin december het "geLAT" definitief achter ons te laten en gezamenlijk onze nieuwe woning te gaan betrekken!

Roosendaal, september 2003.

About the author

Helene Andrea was born on April 30, 1973 in Antwerpen (Belgium). In 1992 she finished secondary school (VWO) at the 'Nassau Scholengemeenschap' in Breda.
From 1992 to 1997, she studied Mental Health Sciences at the Faculty of Health Sciences of Maastricht University. During this study, she conducted research on relationships between disgust sensitivity and spider phobia. This topic was also studied during a visit of three months at the Psychology Group of the School of Cognitive and Computing Sciences, University of Sussex, Brighton (United Kingdom). She graduated at Maastricht University in September 1997.
Between September 1998 and December 2002, she was appointed as a PhD student at the Department of General Practice, Maastricht University and conducted the research presented in this dissertation. A work visit of one month to the Psychology Group of the School of Cognitive and Computing Sciences, University of Sussex, resulted in a jointly written paper (see chapter 6 of this dissertation).
In April 2003, she started working as a researcher and psychologist-diagnostician at Centre of Psychotherapy 'De Viersprong' in Halsteren.
She lives in Roosendaal with her partner Eric Nagtzaam and their two cats.